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CULINARY VEGETABLES OF THE INTERIOR OF RUSSIA.

An account of the most important culinary vegetables of the interior of the Russian empire, with remarks upon their cultivation, their application to the purposes of life, and the manner in which they are preserved during the severity of the winter in the northern parts of the country, is to be found in the third volume of the Memoirs of the Caledonian Horticultural Society, from which we make the following abridgment. The paper was communicated to the Society by W. Howison, M. D. He begins with—

The Russian cucumber—a small smooth species for salting, which is consumed in large quantities by the natives, as also by foreigners settled in the country, both during the summer, in its recent state, and when artificially preserved during winter. It is cultivated extensively in the fields, wholly in the open air, during the short but warm summer of Russia, and in the public garden grounds surrounding the great towns. It is, in general, planted in long rows, along with cabbages, one after the other alternately. The cucumber is also to be found cultivated under glass, which is remarkably cheap in Russia, as it pays little or no duty. This fruit differs in many respects from that of Great Britain. The leaf, and whole plant in general, are much smaller and contracted; and when it has attained its full growth it is short and thick, containing a great quantity of juice and pulpy matter. These last-mentioned qualities render it well adapted for salting, which is the only way the Russians preserve it during winter. They pay particular attention to the soil for its propagation, choosing that which is rich, and surround the root of each plant with a large circle of horse or cow dung.

Before the salted cucumbers are eaten, the thin green-coloured outer-skin is removed by the knife, when the interior is regularly found remarkably pulpy, juicy, and pleasant to the taste. The liquid, which is accumulated around them in great quantity, is charged with the salt, and, with the soluble portion of the vegetable matter, is not unpleasant to the taste, and is used by the Russians as a gentle cooling laxative in fever—about a tumbler to a dose.

The receipt for the preparation and salting of the Russian cucumber, deserves to be universally known, as the article should form an addition to British cookery, now that the cucumber in question has found its way into this country. It is as follows, having been procured from one of the most experienced Russian cucumber-salters, as Dr. Howison informs us.

Take 1000 cucumbers; weigh out 7 lb. English, of salt, which has been previously well purified and dried. Mix the salt well with a quantity of cold soft water, sufficient to cover the cucumbers; 500 of which may be put in one small tight-made cask. Have ready plenty of the following leaves, which have been gathered when the weather was dry:—oak leaves, black currant, cherry, and dill leaves as well as dill heads. Mix them well together, and place a layer of them at the bottom of the cask, then a layer of cucumbers, and thus alternately, until the cask be completely filled. Then pour on the salt and water till it rise to the brim, and close the cask tightly. Some people like a small bottle of vinegar, and a very small bit of garlic to be added to each cask. In two or three months the cucumbers are fit for use, and are brought to table entire, floating among the juice and leaves which surround them in the cask. In Russia they seldom appear at table till the winter has completely set in; and one person will eat several of the cucumbers thus preserved and prepared, during one meal, without any bad effects resulting.

The objection to be apprehended as to the cucumber of this country being fit for a similar mode of treatment, is likely to arise from its fibrous, rather than pulpy nature; and it would appear, although the Russians possess the British variety in abundance, they do not salt it.

The Moscow early yellow turnip, is a small flat-bottomed variety, with a short thin tail, or root issuing from its centre, with firm, dense, reddish-coloured flesh. It is produced in great abundance in the neighbourhood of Moscow, and in the Crimea.

The turnip in all its different varieties is a vegetable used in considerable quantities by the Russian peasantry. They do not boil this article as we do ours; they either eat it in a half raw state, cut down into small pieces, in their stews or soups, or roast them, covered well over with the fir-wood or birch-tree ashes of their stoves, in the manner in which potatoes are often roasted in Scotland. This mode of cooking adds greatly to their taste and flavour, by driving off the superfluous watery particles. By undergoing the process of roasting, the turnip resembles a good deal the Jerusalem artichoke, and when eaten with melted butter, pepper, and salt, it forms a most excellent and highly nutritive dish, particularly for supper. The common yellow turnip of this country, it is said, answers nearly as well as that of Russia, which any one can easily ascertain. The turnip ought to be previously well washed, and slowly roasted, by being completely covered up with heated sand, or fine ash-dust. The smallest and firmest turnips should be chosen. From one to two hours will be found necessary to roast them completely. After taken from the fire, a dry cloth will clean them sufficiently for the table. Turnips are seldom used by the Russians in the feeding of cattle. Variegated cabbages, brought by Krusenstern, the Russian circumnavigator, from the islands of the South Sea, and since that time cultivated in Russia, and the common yellow-hearted cabbage, are said to be consumed in great quantities by the natives. During the summer they use the cabbage in its natural state, either half raw, or in the form of soups, or slightly boiled. And in order to preserve it for winter's consumption, during which period by far the greatest quantity is used, they cause it to undergo the process of partial fermentation, or form what is denominated *sour-krout*. This valuable dish is not only a very important part of the winter food of the boor, but it is also to be met with daily at the tables of the nobility and foreigners, particularly

Germans. It is nutritive and healthy, and procured at little expense.

Every one lays in a stock of cabbage, to make their sour-krout about the month of October, before the setting in of the winter frost, and prepare it in the following manner:—They take a large strong-made wooden vessel or cask, with which every family is furnished, capable of containing as much as is sufficient for the winter's consumption of the family. They then gradually break down or chop the cabbage, deprived entirely of the loose outside leaves, into very small pieces, beginning with one or two cabbages at the bottom of the cask, and adding others at intervals, pressing and rubbing them by means of a wooden spade against the sides of the vessel, when they crumble as it were into a rough unequal powder. This process is continued at intervals until the vessel is nearly full. They then place a heavy weight upon the top of the whole, and allow it to stand near to the peach stove, or any other warm place, for four or five days, by which time it will have undergone fermentation and be ready for use. While the fermentation is going on, a very disagreeable, heavy, fetid, acid smell is emitted, which, by a passer by, may be felt outside of the house. After these four or five days of fermentation the cask is removed to a cool situation, and always kept covered up. Anise-seeds are strewed among the layers of the cabbage during its preparation, and they communicate a peculiar flavour to the sour-krout at an after period.

In the boiling of the sour-krout, and preparation of it for the use of the table, two hours are the least period which they allow it to be on the fire, and it is said to form an excellent nutritious, and at the same time agreeable antiscorbutic for winter use. For the greater part of the year, in one form or another, it supplies the table of the peasant, for it may be made into soup by itself, or boiled along with animal food.

During the very severe winter in the northern parts of Russia, the inhabitants and resident foreigners follow a method of preserving for many months, the cabbage and various other vegetables in their fresh state, in the soil in which they were originally produced, and this they do, when the temperature is as low as 22 degrees below the freezing point of Reaumur's thermometer. All the cabbage which remains after the making of the sour-krout, intended for the winter's consumption in their fresh state, with various kinds of green kale, leeks, &c. are collected together in a part of the garden in which they were growing. The cabbages are sunk in the earth near to each other, up to within a little distance of the head. A temporary structure resembling in shape a melon frame, raised to about four or five feet at one end, by means of a thick turf wall, and furnished with a door to enter by, is erected over the space of ground containing the vegetables. This roof is covered with a layer of dry straw, and above that a layer of coarse mats, made from the bark of trees, such as is used to pack up furniture in this country. When the winter sets in, the whole becomes covered with a layer of snow several feet in depth, and forming a covering which no intensity of frost is able to penetrate. The door is also well lined, and is during the mild weather of the forenoon occasionally opened to allow air and light to enter. The outer leaves are removed to prevent their injuring the cabbages in the progress of their decay.

When speaking of the cabbage, it may be remarked that a French Journal has stated "that the cabbage is a sovereign remedy for curing intoxication from wine, and that it has even the power of preventing it; for we are informed that by eating a certain quantity of cabbage before dinner, we may drink as much wine as we please, without experiencing any inconvenience. This property of the cabbage is mentioned by Aristotle and Theophrastus, who are of opinion that it proceeds from the antipathy which the vine shews for the cabbage. If a cabbage be planted next a vine, the latter either retires or dies."

Large black Russian radish and large white radish are always to be found constituting a part of the vegetable productions of the boor's garden. They are also cultivated in considerable quantity for the inhabitants of towns. The Russians plant them in the spring, as soon as receding winter will permit. By the finger or dibble, holes are made in the ground, and a single seed is next dropped into each hole. The white species is by far the most generally used, owing not only to its appearance, but because it possesses a less degree of pungency. When to be used, the radishes are cut into slices about an hour before they are eaten, and salt strewed upon them in order to alleviate their acrimony. At the end of the hour, the water which has collected about them is poured off, and they are taken to the table. All classes of Russians use this kind of food, especially the lower orders, who consume the radishes along with immense quantities of black rye bread, and salt.

Water melons are cultivated in surprising quantities in the southern parts of the Russian empire, particularly along the banks of the Volga. Their cultivation requires little trouble. They only thrive in the open air, however, to the 52nd degree of south latitude. The melon gardens here might from their size be called fields. They are divided into long beds, between which, in the oriental style, little channels are raised and cut in the clay for watering the plants; and therefore, the gardens are always laid out contiguous to a pool, or to running water. They are treated with scarcely more care than the most common field fruits—coming early forward, and with little pains arriving at an extraordinary size. Melons of thirty pounds weight are quite common, while their succulence and flavour are excellent. They are used in a raw state, along with powdered sugar, ginger, &c. or salted in the same manner as the cucumbers. They are also preserved in a raw state for a considerable period, and from the firmness of their texture, they bear without injury to be removed from the most distant parts of the empire to any other. In the northern parts water melons are also brought to maturity in considerable quantities, under glass. What is principally necessary during their cultivation in this manner, is to take particular care not to injure the very strong and creeping shoots which the plant sends out during its progress, and either to raise the frames and allow them to spread out into an adjoining one, or to keep each, by bending, entirely within its own, which in that case requires to be long and roomy. It is from neglecting this, that the failure of the cultivation of the water melon in Britain is said to be attributed by the British and native gardeners throughout the Russian empire. If the shoots are in any way checked or injured during their growth, the plant is observed to suffer, and the future progress of the fruit towards maturity is either interrupted or wholly destroyed. In Russia attention to this circumstance is considered of much more consequence than heat; and it is stated as being well known, that the water melon plant, propagated by the artificial heat produced by glass frames, will flourish, and the fruit reach its full size at the same temperature at which any of the common species of melon will do.

As the plants are remarkably strong and luxuriant, and send out very large leaves and extensive shoots, one is quite sufficient to fill a large sized glass frame. Water melons are known to be ripe and ready, not by the smell, but by the peculiar sensation which they communicate to the hand when struck. If they are allowed to remain adhering to the plant until the seeds shake within them, they are good for nothing excepting their seed. When their external rough skin is removed, and they are cut into slices, they may be eaten in their raw state with salt, in the manner of common celery.

Bulbous-rooted celery, and red celery are said to be cultivated in considerable quantities both in Germany and Russia, as well as other parts of the continent. The former has an irregular contracted looking root, in some degree resembling that of a dwarfish, ill-grown turnip. The roots are cut away as soon as the plant is ripe, and preserved in sand for the winter consumption. When cut down they make an excellent strong flavoured soup, during the whole winter.

A peculiar species of mustard, from Russian Tartary, is described as belonging exclusively to that part of the world, and is used in great quantities by the Russians as a seasoning to their dishes. Mustard, particularly the white species, is cultivated in the south of Russia on a very large scale, where oil is expressed from it, after it has been decorticated in hand-mills, and the mealy part which remains is used like English mustard, to which it is equal. It is observed that mustard generally produces sixty-fold crops, and that the oil and flour of mustard exceed the value of wheat in a similar proportion.

Siberian honeysuckle is a beautiful perennial shrub, which grows to a considerable height and bears flowers the first year from the seed. It forms beautiful hedge-rows round gardens and gentlemen's parks, and from being a native of Siberia is remarkably hardy, while it forms a thick, dense hedge, so as scarcely to allow the smallest animal to penetrate it towards the root. It thus seems admirably calculated for the northern parts of this country.

A peculiar species of onion, from Chinese Tartary, is spoken of by Dr. Howison, as having been brought to Russia by a member of the Russian embassy, but as he has not seen it, he declines giving a description of it. The onion, the leek, &c. he says, may justly be denominated the favourite vegetables of the Russian boor. They are also cultivated in great quantities in the field around the principal towns. They are eaten along with large slices of black acid rye bread and quass, an acid liquor prepared from rye, flour, and malt, by the process of fermentation. In many of the sea port towns of the Russian Empire, during the summer months, almost every sailor you meet has in one hand a large circular loaf of the bread now named, whilst in the other he carries a bundle of leeks, and these, with quass, constitute his daily sustenance at that season of the year.

Mr. Howison gives two Russian receipts: one for preventing mildew upon fruit trees, the other for preventing gumming, or the spontaneous exudation of the gum, which is very destructive in the hothouses of Russia. As to the first, take one quart of watky (a Russian spirit distilled from rye, and resembling whisky), two pounds of powdered sulphur, two ounces of copperas, and a small quantity of camphor. Dissolve the camphor, reduced to powder, gradually in the spirit, then dissolve also the copperas in it; then rub in gradually the powdered sulphur into the solution—when the whole will form a mixture of a thickish consistence.

The fruit trees in the spring of the year, immediately after being cleaned and tied up, are to have their trunks and all their branches completely covered with this mixture, by means of a large brush.

The second receipt consists of horse dung, mixed well with a quantity of clay and a little sand, so as to make a composition; then add a quantity of pitch tar, and form a wettish composition of the whole. The fruit trees in the spring of the year, after they are cleaned and tied up, are to have their trunks and stems completely bedaubed with this mixture; when it dries it forms a fine paste or cover around them, and it is to be allowed to remain for months till it fall off spontaneously. Both receipts are said to be used with the greatest success.

In the northern parts of Russia, as in the neighbourhood of St. Petersburgh, and still farther north, no fruit trees, with the exception of the hardiest species of apple, will bring to maturity their first fruit in the open air, consequently they must all, the cherry tree included, be reared under glass. Indeed there is scarcely any plant or flowering shrub, not always excepting the hardy whin bush or furze, Mr. Howison states, that can resist the winter frost, or be then found out of doors. Lilacs, alburnums, thorns, &c. growing in large wooden tubs filled with earth are preserved within doors all winter, to be again sunk in the borders of the garden, as soon as the weather will permit. But in the short period of a week after the disappearance of the winter, a beautiful and rich display of shrubs, flowers, &c. in full blow become visible. These are reared in hot-houses at a cheap rate in Russia. As soon as one sort has thrown its flowers, another is brought out to replace it, thus keeping up an artificial garden during the whole of the warm season. The approach of cold weather again is the signal for the removal of the whole from the borders, &c. of gardens, and the stairs, galleries, &c. of the mansions of the wealthy and great.

The Russians of all ranks are remarkably fond of flowers. The poorest house, in winter, is filled with them. The streets of St. Petersburgh, Moscow, &c. at the commencement of summer, are crowded with the sellers of all varieties of flowers and beautiful shrubs—the hydrangea, however, from its showy appearance, and durability of its flower, being an especial favourite. By watering it with a solution of alum, the splendour and variety of its colour are greatly enhanced.

In the same regions of the empire now spoken of, almost every description of seeds are brought forward by steeping in water for some time before they are put into the ground, and different species of young plants are reared to a considerable length first in hot-houses.

In conclusion, Mr. Howison is firmly persuaded that the cucumber, the turnip, the cabbage, and the water melon, already spoken of, might be introduced with great advantage into Great Britain, and prove a considerable and useful addition to our winter stock of food. It seems clear, however, that if cultivatable in this country, the modes of their culinary application would be different from those that are practised in Russia. But this could be no drawback to their value, inasmuch as, were our cooks once to have possession of the articles, they soon would find out a way to use them, suitable to our palates, whilst the hints as to the manner of keeping them throughout the winter, as practised in Russia, might be successfully followed; and indeed they seem worthy of the attention of *Preservers*, in reference to various productions already abundant amongst us, during the summer months.

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CORNWALL.

This county forms the south-western extremity of Great Britain. It forms nearly a complete island, for it is bounded on all sides by the sea, except on the east, where it meets Devonshire in a few places, and is separated from it, for the most part, by the river Tamar. From this last boundary its breadth is diminished till it terminates on the west at the Land's End, and on the south at the Lizard Point, assuming a shape not unlike a cornucopia; its boundaries, the Bristol Channel on the north, and the British Channel on the south, meeting in a point at the promontory on the west. Indeed some have derived the name of Cornwall from the Latin word *cornu*, or the British *kern*, "a horn," on account of its form; but others think it is compounded of *corn*, signifying a "rock," in the British, and Gaulls or Waals, the name which the Saxons gave to the Britons.

Cornwall is situated in the diocese of Exeter, and belongs to the Western circuit. It extends over 758,484 acres, and contains nine hundreds, 201 parishes, and 23 market towns. The waste lands are about one-fifth of the whole. The surface is very irregular. The interior is elevated and barren, consisting generally of rugged heaths and moors, although the highest hill is only 1368 feet above the level of the sea at low water. Some beautifully picturesque valleys intervene, richly diversified with corn, woods, coppices, orchards, rivulets, and verdant meadows. The stupendous rocks which form the great barriers against the ocean, particularly about the Land's End and the Lizard, excite sublime thoughts. Throughout the higher lands the soil is of a light black earth, intermixed with gravel, but a light loam, mixed with slaty matter, prevails on the gentle declivities and lower grounds. For three-fourths of the year the wind blows from the west and south points, bringing with it from the Atlantic vast bodies of clouds, which, being broken by the narrow ridge-like hills of the county, descend in frequent showers. Storms are more frequent and violent than in the inland parts of England. It is observed, however, that the rains are not near so heavy as in many other quarters. The moisture of the climate is as much owing to the fogs as to the showers that fall. Snow seldom lies for any considerable length of time. The north west winds, on the north side of the county, are extremely violent and desolating often, but they are generally dry and bring fair weather. The climate indeed is healthy; for since the winds are often changing, those stagnations of damp air which are so prejudicial in some wet countries are almost unknown. In consequence of the salt spray of the sea being sometimes driven across the crops to a great distance, much damage is thereby done. Most of the trees and shrubs lean to the eastward, and have the appearance of being clipped by the gardener's shears. The southern latitude of Cornwall, and the prevalence of the south-west winds, give it such a degree of mildness, that geraniums, myrtles, and other tender shrubs, thrive remarkably well in the open air. The only shrub which seems to grow to a height of ten or twelve feet in seven years, in situations most exposed to the sea, is the tamarisk, which forms an admirable shelter, and as it bears cutting, might be useful also as a fence. Yet it is destroyed by severe frosts. The cuttings, by which it is propagated, take root without difficulty. Till within these few years the attempt to raise plantations was scarcely ever successful; but latterly the pineaster being first planted as a shelter to the more tender trees, their appearance is more promising.

The principal rivers are the Tamar, the Lynher, the Looe, the Fawy, the Camel or Alan, and the Fal. The Tamar is the most considerable. It rises on the summit of a moor in the most southern parish in the county, and taking a southerly direction, falls, along with several tributary streams, into the spacious basin called the Hamoaze, and issuing thence between Mount-Edgecombe and the Devil's Point, unites with the waters of the Plym; and the conflux of these rivers with the sea forms the noble road for shipping named Plymouth Sound.

The landed property of Cornwall is very much divided, so that the estates are seldom large. What are called the Duchy lands are far more extensive. The income from them and from the duty on the coinage of tin, are the only parts unalienated of the immense hereditary revenues which formerly constituted an independent provision for the heir-apparent to the Crown. A lease for three lives is common in these lands for a fine paid at the time of the grant, and also a reserved rent during the lease. Leases at rack-rent seldom exceed fourteen years. The farms are very small generally, and in the western and mining districts they are chiefly cottage buildings. Agriculture being but a subordinate concern in Cornwall, it is not pursued with much spirit and success, and the fines paid for their long leases deprive the farmers of that capital which should be invested in the improvement of the soil from year to year.

In this county the agricultural implements are very various, but few of them are peculiar to it. The Cornish waggon, or wain, however, may be recommended, as being extremely well adapted for carrying corn and hay in harvest time. The old Cornish plough is a rude and simple instrument, which still maintains its ground in many parts of the county. In the lower parts of Cornwall, corn is thrashed on *barn boards*, raised above the level of the barn floor, each plank being about the third of an inch from the next to it, so that the grain falls through it without being bruised. In some parts the wheat is beaten out by women on a barrel or inclined plane. Nearly one third of the cultivated land is under the plough; and the crops generally grown are wheat, barley, and oats. The soil and climate of Cornwall are particularly favourable to the growth of potatoes, which are in consequence extensively cultivated. The uninclosed lands serve little other purpose than to afford a scanty pasturage to a miserable breed of sheep and goats. And the general produce of agriculture would be much more scanty than it is, were it not for abundant supplies of three valuable manures, two of which, as almost peculiar, deserve to be mentioned. These are fish and sea-sand; sea-weed is the third sort. Bruised and small pilchards, called "*caff*," are buried in a pile of earth, where they are permitted to lie some months before they are laid on the ground; sometimes the fish are used alone. The liquor which drains from them, while under the process of curing, is also deemed a valuable manure. The sea-sand of Cornwall is found to be fertilizing in a high degree, as it contains in general a great portion of calcareous matter, and some of it a slimy earthy matter, called *lig*, or *liggair*, which is applied to potatoes. The sand in highest estimation is found near Falmouth; it is frequently carried fifteen miles inland upon horses, mules, or asses. This sand has a more immediate as well as a more permanent good effect, on the moor-lands than on the loamy soils. Lime is found in two parishes of the county, but is more valuable as a cement than as a manure.

The native cattle of Cornwall are now rare; they are very small, coarse boned, and with a large proportion of offal. The North Devon breed has been introduced, which is much used in labour. The native sheep are also nearly extinct; they were one of the worst descriptions in Britain. They have been described as having little bodies, and coarse fleeces, so that their wool bore no better name than Cornish hair, from ancient times having been transported without paying custom.

Cornwall is chiefly celebrated for its mineral treasures, of which the most remarkable are tin and copper. Of the fish on the coast, the pilchard is the most abundant and valuable. In form and size it differs little from the common herring. They are caught in immense quantities by nets, during the summer and autumn. Each net is managed by three boats, containing from seventeen to twenty-four men, the largest kind being two hundred and twenty fathoms long, sixteen fathoms deep in the middle, and fourteen at each end. They are stored in cellars by layers, salt being strewed between every layer. After some weeks they are taken up, washed, and placed in hogsheads, where, by means of a powerful lever, they are pressed so closely as when turned out to appear a solid body. By this process forty-eight hogsheads generally yield about a tun of two hundred and forty-two gallons of oil.

Of rare plants, the following are mentioned as growing in Cornwall; near Fowey, on a slaty soil, to which it is extremely partial, *Sibthorpia Europea*. Near the village of Mullion, *Erica vagans*, the most rare and beautiful of the British heaths: it is also found near Helston. About the Lizard, *Asparagus officinalis* and *Herniaria glabra* are found. *Tamarix gallica*, a shrub, for a long time not arranged among British plants, grows wild, in the same parts. It thrives well in situations most exposed to the sea, and forms there an admirable shelter. Besides several other scarce plants in Cornwall that might be named, one of the rarest in Britain grows on the skirts of a wood, about a mile north from Bodmin, viz. *Ligusticum Cornubiense*.

There are very few manufactures in this county. It abounds with antiquities, many of which are supposed to be Druidical. There are some grand and impressive sea views to be obtained, such as from St. Michael's Mount, and off the Land's End. The people are renowned for their athletic sports, in which those of wrestling and hunting are the principal. The tinners have holidays peculiar to themselves, particularly the Thursday before Christmas day, in commemoration of block tin being first melted into white. The inhabitants in general are of a large and strong make. The population in 1811 amounted to 216,667; in 1812 to 257,447; and in 1831, to 302,440.

The Landscape Gardener, comprising the History and Principles of Tasteful Horticulture. By J. Dennis, B. C. L. London: Ridgway & Sons. 1835.

The reverend author of this treatise, after concisely tracing the history of landscape gardening, and minutely detailing its principles, suggests corrections of various defects; which, according to these principles, still extensively prevail. He says, that the entire subject matter of the work comprises simply a collection of reminiscences treasured up in his own mind, without in a single instance his being indebted to other writers—personal observation, experiment, and careful deliberation, alone having directed him. The work itself sufficiently proves the author's enthusiasm, and deep study on the subject of landscape gardening, at the same time that it is eminently calculated to excite in his readers a similar spirit of research, and consequently introduce a more extensive, simple, and intelligible system than has hitherto prevailed even in this country, where such a thorough reform over the Dutch School has for a number of years prevailed.

We do not altogether coincide with the author in every view entertained by him as to details, much less are we in love with the style in which he clothes his ideas; that being artificial and stiff, and extremely unlike what he recommends in landscape gardening as the great object of pursuit, viz. a seemingly easy imitation of nature. The work, however, is that of a scholar, an original thinker, and well informed observer of whatever falls under the subject he handles; and, therefore, we feel assured that we shall contribute to the extension of valuable knowledge and principles in the art to which he is so partial, by laying before our readers some of the most striking passages of the work. When we say that our apprehension of the author's theory and illustrations is so distinct and complete, that the landscapes which he describes or imagines, stand out, before the mind's eye, like living and real scenes, nothing from us can give a more favourable account of the work. The following extracts will enable all our readers to judge for themselves; these at present form the first half of the volume.

After giving a historical sketch of landscape gardening, from the time when the Monastic orders were the only horticulturists, and royal or priorial parks were enclosed and cherished as preserves of game—the destruction of forests for conversion into tillage-land, requiring of those who could support the amusements of the chase, such protective measures—the author takes notice of various styles of the art of which he treats, till he comes down to the great revolution in its principles introduced by Kent, and advanced by Capability Brown and others, over the Dutch style, with its tables of box and peacocks of yew. In connexion with Brown's name we have the following improvements in the art of landscape gardening, forcibly established.

"His favourite objects were plantation of large clumps of trees, and formation of large sheets of water. Of the former partiality he received a humorous memento, when escorting the justices of assize, with his troop of javelin-men marching in slovenly disorder; and, being in consequence, loudly accosted by a wag with, 'Brown, clump your javelin-men.' To produce a natural appearance, trees should be arranged, not in clumps, but in groups, naturally shaped, and judiciously interspersed with detached trees, neither too frequently recurring, nor excluding bold spaces of open lawn.

"But Brown's grand forte was water. Here he found himself in his proper element, and by a most successful effort at Blenheim, may defy animadversions from the severest criticism. Conscious of success, he exulted in the achievement, and was accustomed to boast that 'the Thames would never forgive him what he had done at Blenheim.' A visitor of that splendid domain, unapprised of its progressive improvement, could not for a moment imagine Sir John Vanburgh's having actually erected the massive bridge, surpassed in the span of its arch only by the Rialto, at Venice, without contemplating the possible formation of water. His object was simply to break the declivity of a road crossing the valley, intervening between the palace and an opposite hill, and presenting avenues of trees disposed in form of the order of the troops at the battle of Blenheim, while exhibiting to the eye a commemorative obelisk, on termination of the visto.

"Brown had penetration and ingenuity, by supplying the desideratum, to superadd a most splendid feature in this magnificent domain. Erecting a barrier of massive rocks across the valley towards the back-front of the palace, he obstructed the passage of a scarcely perceptible rill of water, crossing the end of the town of Woodstock, and thus created an expanded lake, tastefully flowing round the abrupt steep surmounted by the palace; and which having dashed over the rocks in grand cascade, gently glides through the opposite side of the grounds, with every appearance of a beautiful natural river. Indeed, Brown had the credit of producing the finest instance of artificial water in the kingdom; and for encouragement of future engineers, from a source too trivial to suggest its feasibility to an inexperienced spectator.

"Of all appendages, few involve the proprietor in greater expense, therefore few are attempted; while in truth few require less expense, if constructed on a correct and economical system. Wherever a perennial spring is found, if not exceeding in quantity what might pass through a finger-ring, it is sufficient to form the largest sheet required. On the principle of hydrostatic law, of water always finding its level, it may be made to rise to any height equal to the elevation of a barrier interposed for the purpose. For construction of such barrier or head, stone, brick, or wood, is seldom required. The only materials in general necessary are oaken stakes of considerable length and thickness, with stiff puddled clay, shaped into an inclined plane. The streamlets passing through pleasure grounds seldom swell into a torrent irresistible to such a head. If watling be added, it will present a head adequate to resist the swoln water of a river of moderate extent. In case however of a very considerable body of water requiring increased resistance, the inclined plane may be fortified with stone, dropped down without cement. This contrivance will form an impregnable barrier."

The author's practical observations on the improvement of verdure are valuable.

"Removal of earth being attended with very considerable labour and expense, moderate excavation should be attempted in the first instance. Width and length, not depth, are all the points expedient to produce effect; and by removing scarcely more than the sod and mould, on commencement of a sheet of water, material will remain for supply of manure each alternate year. Verdure improves in tint and thickness by frequent dressing and mowing, brushing and rolling. By application of earth, still better of compost, combining dung, ashes, and lime with mould, or even pulverised lime-rubbish, and subsequent pressure with a heavy roller, the roots of the grass having acquired increased covering and stimulus, will shoot with astonishing luxuriance. The deepest tinted, thickest, and in all respects finest grass, was produced in the plantation gardens of Powderham Castle in Devonshire, during the proprietor's occupation. It was mowed, brushed, and rolled in summer thrice in a week, and annually manured. For areas of a moderate size, the stunted grass of a common forms the most convenient turf, from not requiring to be frequently mowed. In the vicinity of London it is termed by gardeners moonlight turf, being obtainable by stealth from commons contiguous to the metropolis only in moonlight nights, the light of a lanthorn endangering detection from the adjacent habitations. The greatest difficulty is experienced in raising grass from seed on the site of a vegetable garden, the young shoots being attacked by slugs, previously harboured by cabbages, lettuces, and other broad-leafed vegetables. The most efficient preventive is preparatory destruction of insects by slaked lime. All grass-plots should occasionally be rolled with a loaded roller before sunrise or by night, to crush insects, before repairing to their diurnal haunts; or still better, some time after a shower, their preference for feeding being on grass moist with rain or dew. The shorter grass be kept, the less harbour does it present to insects; and if permitted to become of length for fodder, it loses during a considerable interval its verdant tint. If from intense heat, protracted drought, or frequent treading, the root decay, seed should be scattered on the surface, and covered with mould and wood ashes, the latter being particularly congenial to increase of trefoil. This species of seed mixed with Dutch clover and rye grast, or as it is sometimes, from permanent durability, called, ever-grass, combines to produce the most eligible description of grass. Common English clover should studiously be avoided, being, from luxuriant and rapid growth, destructive by its shade to vegetation of the admixed seeds; and itself not exceeding two years in duration. It is merely adapted, by addition to barley seed or oats, to supply the agriculturist with temporary pasture, it being exceeded by grain in rapidity of vegetation, therefore not impeding its production; but from gardens or lawns it should scrupulously be excluded. Should wild flowers, as the daisy, deut-de-leon, or golden-cup accidentally mix with grass, they should carefully be eradicated in the spring, previously to seeding; being when neglected both dislieved, with vivid and glossy green; or if the contrast appear too strong, it may be mellowed by blending Portugal laurel in intermediate position. In short, the recommendation cannot be too frequently reiterated, to substitute studied assortment of tints for tasteless, indiscriminate admixture. Let but the pictorial artist be permitted, or the amateur condescend, to transfer his principles of taste, the one from his easel, the other from his gallery, to occasional superintendence of English landscape gardening, and they would contribute to production of a living vegetative picture, constituting incalculable improvement in style, and commanding inevitable commendation from the spectator of cultivated taste. Nay, pleasure grounds thus constructed, would excite universal admiration, and impart universal gratification. Pictoresque effect, copying and harmonising with natural scenery, elicits pleasurable emotions, even in such as 'know not why, and care not wherefore.' But for accomplishment of such important *desideratum*, science must be suffered to acquire unlimited confidence, in exercise of control; while prejudice must cease to plead for senseless 'custom, more honoured in the breach than in the observance.' An individual proprietor, or a public association, might rest assured of the anticipation of a result, decidedly warranting the experiment."

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Remarks on the Geographical Distribution of British Plants; chiefly in connection with Latitude, Elevation, and Climate. By Hewett Cottrell Watson. London: Longman and Co. 1835.

This is not the only cheap, useful, and modest manual that has been lately compiled by Mr. Watson, as an important assistant to the student of botany, to aid him in the speedy acquisition of a minute knowledge of the distribution of British plants. There has also been published by him a New Botanists' Guide, including all the counties of England and Wales, the counties of Scotland, with the adjacent isles from Man to Shetland, being intended to form a second volume of the Guide; and a third work is contemplated, which will embrace the particular distribution of species, considered individually, and the conditions or causes on which such may appear to depend. The present volume is a praiseworthy and successful attempt, and one which must have required no ordinary labour. We have pleasure in quoting the following becoming passage in the preface:—"The title of Remarks chosen for the present volume is to be taken quite literally. To fix on and form the first rude line of road over a trackless waste, is often a much more laborious undertaking than the subsequent repair and improvement of it; and, although such title is intended as a confession that the present sketch is by no means complete, it has required more time and patience, particularly in constructing the tables, than will be supposed by many persons who may now find a facile task in correcting and improving it." Let fault-finders, if there should be any, therefore rather accede to the author's request, viz. to aid him by suggestions, notes, specimens, or other means, whereby he may be enabled to correct errors, or supply defects, or endeavour to do better themselves, than be too critical. The present little book unquestionably lays the foundation for very exact knowledge on the geographical distribution of plants, and must be, together with the other works published, or about to be published by the author, the means of greatly facilitating the studies of young botanists in particular, by not merely enabling them speedily to ascertain many facts, or it may be solve matters of doubt, but by infusing into their pursuits many pleasurable and encouraging circumstances.

The various and numerous Tables introduced in this work, relative to the distribution, extension, and localities of British plants, as also to elevation, temperature, rain, &c., which have occasioned the author the greatest trouble in the execution of his task, we recommend to the attention and study of all botanists. The extracts that can be most conveniently taken into our pages, from the Remarks, will sufficiently recommend themselves to show the author's manner, talent, and industry.

Our first extract is from "General Remarks on the Flora and Vegetation of Great Britain."

"It is not an easy matter, in the present day, to define the flora of Britain. Many species, originally introduced by human agency, now exist in a wild state; some of them only continued by unintentional sowings along with corn, or other cultivated plants; while several keep their acquired hold of the soil unaided, and often despite our efforts to dispossess them. Both these classes certainly *now* constitute a part of the British flora, with just as much claim as Saxons or Normans have to be considered a part of the British nation. But there is a third class, consisting of plants which have yet acquired a very uncertain right to be incorporated with the proper spontaneous flora of the island, albeit many botanists anxiously seek to include them in it;—an anxiety perhaps originating more in the *Love of Approbation* (phrenologically speaking) than in the *Love of Science*. This third class consists partly of species springing up occasionally from seeds or roots thrown out of gardens, and maintaining themselves a few years; and partly also of those designedly planted for ornamental or economical purposes. Such are no more entitled to be called Britons, than are the Frenchmen or Germans who occasionally make their homes in England. In addition to these, our descriptive floras include a considerable number now extinct, or never actually found wild in Britain. The numerical estimate, and in some measure also the botanical character of our flora, will vary accordingly as these classes of plants are included or excluded. Other circumstances, indeed, prevent the exact number of species being determined, for scarcely two writers on the flora of the same country will be found to agree in their divisions into species and varieties, so that the supposed number of species is continually fluctuating; but the general tendency of the present day is to increase them, independently of new discoveries.

"According to Mr. Arnott's calculations, the flowering plants of the British isles amount to 1503 species, by Smith's English Flora; and by Gray's Natural Arrangement of British Plants, to 1636. Hooker's British Flora, different editions, contains between 1500 and 1520 species. But these works include Ireland and the Channel isles along with Britain itself. Deducting about twenty species peculiar to one or other of the former islands, and at least as many extinct or mistaken species, we may estimate the British flora at about 1470 species, of which a considerable number have only doubtful, and several only extremely doubtful, claim to be admitted into it. Expunging a number of vague or nominal species (Salix Stewartiani, Epipactis purpurata, Carex angustifolia, &c.), and others scarcely established except where planted or sown (Castanea vulgaris, Crocus aureus, Linum usitatissimum, &c.), we may say that 1400 species is the extreme limit of our present flora, from which number some botanists would strike out 200, as varieties or introduced species. Indeed, 1200 species is probably too large an allowance for a rigidly exact estimate; but in accordance with the views generally entertained in the present day, I should take 1400 to 1450 species as the proper estimate of our flora, when wishing to make comparison numerically with that of another country, or of parts of our own."

After going more particularly into a numerical estimate, the author comes to the botanical character of a flora, and after a comparative scale of Natural Orders, offers these observations:

"But many obvious and important peculiarities of plants being altogether unheeded in botanical classification, or at least not allowed to interfere materially with it, the general character of a flora is incompletely shown by reference to orders and genera alone. Still less can such a test give any just idea of the floral landscape or physiognomy of vegetation, since this depends much more on the prevalence of particular species, in respect to the number and magnitude of individual specimens, than on the number of species referred to any particular order or genus. Thus the *genera* Corylus, Calluna, Bellis, and Anthoxanthum, containing only one species each, form a far greater constituent of British vegetation than do Ophrys, Orobanche, Pyrola, and Scirpus, each containing several.

"To depict the vegetation of a country, it hence becomes necessary to state the comparative frequency and copiousness of *each* species. For a small space, this is readily enough determined; but local scarcity or abundance, from differences of climate, soil, humidity, and other conditions, so very materially interferes with any attempt to do this for large tracts, that if two botanists, resident in different counties, were requested to place the names of a hundred species in a scale or series representing the comparative degree of rarity or abundance, they would be very unlikely to agree in their order of position. It would, indeed, be sufficiently easy to select a hundred species which all British botanists would agree to call *rare;* and possibly a like number might be found, which they would all of them esteem *common;* but what could they say about the other twelve or thirteen hundreds?

"As an approximation to some estimate of the comparative frequency of occurrence of the different species, in the table appended to this volume I have shown the latitudinal and regional range of each species, and also the number of published local Floras, and of my MS. Catalogues, in which it is mentioned. For the *rarer* species, or those not mentioned in three fourths of the local Floras, the number of counties in which I have stations is the best single test I can give of their scarcity or frequency; which may be ascertained by reference to the *New Botanist's Guide;* a work likely to be before the public at an earlier date than the present one. A little reflexion and calculation will readily enable even a stranger to British vegetation to determine its physiognomy by these aids, since the number of Floras, Catalogues and counties, in which a species occurs, taken in connection with its latitudinal and regional range, must be a near approach to precision on such head. The chief obstacle to this proving a rigid test will arise from the circumstance of some species being as widely and generally diffused, though less numerous than others in individual specimens. By reference to the table, it will be seen that Ranunculus acris extends the whole length of Britain in latitude, ranges from the Plains to the Alps, and is mentioned in every Flora and Catalogue. It is consequently one of the very few species boasting ubiquity, and may fairly be set down as one of the commonest plants we have. Ranunculus Ficaria is as widely and generally spread, with one exception, that it does not attain the Alps. Hence we conclude it to be equally common as the preceding in the low grounds, but less so on the mountains. R. auricomus, wanting in one Flora and six Catalogues, and not ascertained to grow in the 59th degree of latitude, or above the Upland Region (I believe it *does* reach the Alps), may be presumed considerably less common than the two preceding species. R. parviflorus, extending only one half the length of Britain, limited to the plains, and mentioned only in about half the Floras and Catalogues, must be much rarer than any of the others, though occurring in twenty-eight counties. And R. alpestris, peculiar to a single degree of latitude, indeed to a single county, must rank among the rarest of British plants. These examples will indicate the use of the table towards determining the comparative scarcity or frequency of species. It would be easy to group the species in lists according thereto; but as this would be merely a repetition, though differently arranged, of the information contained in the table, I avoid the additional type and paper that would be required. My object is to condense such matters as much as possible. It is usually a more facile task to make a large book, than to convey the same actual information in a small one."

After stating how defective the knowledge of British botanists generally is as to the distribution of plants in their own country, the author, in his remarks on the data that he has followed, has thus expressed himself:—

"For information on the influence of elevation, and the range and distribution of plants in connection therewith, I have hitherto been compelled to rely almost solely on my own limited and transitory opportunities for observation. This is much to be regretted, so little being published on the subject, that almost every thing had to be done; a task beyond the power of one whose place of residence has always been remote from the mountain tracts. And much as my works will show me indebted to botanical friends for their exertions and assistance in other respects, it seems that few of them have felt sufficient interest in that department to which I have attached the most importance. It is true, and it would be injustice to conceal, that several correspondents have given various useful facts in regard thereto. Thus, in the lists of plants for the Tees, Mr. Hogg has distinguished those chiefly, or only, found in the middle and higher parts of the course of that river. And Mr. Gordon, also, in the list of Moray plants, has distinguished them into three stages, according to their ranges from the mountains towards the coast. But such divisions, having reference only to their lower limits, can apply to a very small number. Their higher limits, or lines of cessation towards and on the mountains, constitute the most essential inquiry. Very few species reach the mountain-summits, but most of them descend to the shores. I have also derived additional information from Mr. Gordon and Mr. W. C. Trevelyan, with respect to the range of several species into the Upland Zone (of the *Outlines*) which I had not enjoyed the opportunity of ascertaining. In Murray's Encyclopædia of Geography is a notice of the distribution of plants in Britain, founded on *Winch's Sketch*, before mentioned, and observations by the Rev. J. Farquharson, of Alford, Aberdeenshire, on the heights attained by different species (chiefly as cultivated plants) in his vicinity. That district, however, is unfavourable for ascertaining the true limits, and hence they are usually given too low for the county in general, though doubtless correct for the particular tract."

In the chapter immediately treating of the distribution of plants in Britain, ascending regions are first treated of, under Plains, Uplands, Medians, Subalps, and Alps. We cite some paragraphs from this portion of the work.

"The *Region of the Plains* is too well known to British botanists to call for any particular description. It will include all the low or open country from the south coast of England to the borders of the Highlands in latitude 56—56½, terminating at the sea level on the shores of the Clyde and Tay. All hills attaining a sufficient elevation to produce species, which are not found in the low and open situations within this portion of Britain, will be referred to the higher regions. The absolute height at which such species grow is of little import in determining the line dividing the plains and uplands, since many species never found in the open country, do descend almost to the sea level about the bases of mountains or in the intervening valleys. A species *ascending* into such situations is still called a species of the plains, while one *descending* to the same place may be referred to the uplands only. If decidedly crossing each other, the one in an ascending, and the other in a descending range, they will be considered common to the two regions. Some latitude must be allowed in these instances, and very slight trespasses into an adjacent region be overlooked. Such will usually be found in connection with the efflux of cold springs, the spray of descending streams, the shade of rocks, or other circumstances causing a local deterioration of the climate to which the plant is exposed

"The usual or prevalent vegetation of the plains is that most familiar to us, and generally known as *weeds* or *wild flowers.* The oak and ash form the principal truly indigenous forest trees of the region; to which some of the larger willows may be added. The beech, limes and elms (excepting Ulmus montana) are scarcely admitted to be hereditary Britons. The chesnut and sycamore, frequently planted, have a still more doubtful title. Ulmus montana and Betula alba, seen in many places here, are more characteristic of the uplands. Among other arborescent species, sometimes growing to trees, sometimes forming large shrubs, may be mentioned, as of common occurrence, Cratægus Oxyacantha, Ilex Aquifolium, Corylus Avellana, Alnus glutinosa, Sambucus nigra, and Pyrus Malus, with species of Salix. Acer campestre is frequent in the south of England, but dwindles off northward both in size and frequency. Rhamnus catharticus and Euonymus europæus are locally plentiful, and chiefly in the south and middle of England. A great portion of the underwood, hedgerows, and coppices, are composed of the smaller-sized trees just enumerated, together with the various species of Rosa, Rubus, and Salix, Prunus spinosa, Viburnum Opulus, and Lonicera Periclymenum. Cornus sanguinea, Viburnum Lantana, Ligustrum vulgare, are local, and more plentiful in the south and middle of England. The smaller shrubs occupying the commons and other exposed places are chiefly Ulex europæus, U. nanus, Cytisus scoparius, Ononis arvensis, O. spinosa, Genista anglica, Calluna vulgaris, Erica cinerea, E. Tetralix, Rosa arvensis, R. spinosa, Rubus fructicosus, and other varieties or species. Ruscus aculeatus occurs principally in the south of England. Vaccinium Myrtillus is more plentiful in Scotland and the north and west of England. The gravelly commons in the south of England are more frequently covered with the rosaceous and papilionaceous shrubs; those in the north and west with the Ericineæ. In the lower or more southern part of the region, we sometimes find in great plenty various herbaceous species which gradually run out or become rare northwards; such are Tamus communis, Bryonia dioica, Linaria Elatine, Euphorbia exigua, E. amygdaloides, Poa aquatica, Verbena officinalis, Linum angustifolium, Sison Amomum, Antirrhinum Orontium, Cnicus acaulis, Anthemis nobilis, &c. &c. On the other hand, several, that are rare or wanting in the south and south-east of England, decidedly increase in frequency northwards or towards the hilly tracts; such are Pinguicula vulgaris, Parnassia palustris, Geranium sylvaticum, Trollius europæus, Lysimachia nemorum, Carex dioica, Gymnadenia conopsea, Habenaria, bifolia, H. viridis, Narthecium ossifragum, and Comarum palustre. Empetrum nigrum (Sussex), Saxifraga hypnoides (Somerset), and Habenaria albida are very uncommon in the plains, indeed scarcely belonging hereto.

"In the extreme south of England, the orange ripens fruit when trained against walls and with the occasional protection of mats in severe weather. Some varieties of grape ripen yearly against walls in the south of England, and in very favourable seasons almost over the whole region. The w[illegible]t, filbert, fig, mulberry, and apricot succeed as standard[illegible] but chiefly in the southern part of the region. The chesnut [illegible]pens on the shore of the Firth of Froth. The myrtle endures the open air in the south and middle of England, but is chiefly seen against walls or near the coast. Magnolias, Fuchsias, and Pelargoniums may also be kept in the open ground, but the latter are usually considered to demand some protection. The Camellia japonica is said to bear the open air in Devon. Maurandya Barclayana, Eccremocarpus scabar, and Nierembergia phœnicea succeed in gardens, but require mats or other protection during winter.

"*The Upland Region* is marked by the presence of Arbutus, Uva-Ursi, Vaccinium Vitis-Idæa, Polygonum viviparum, Linnæa borealis, Trientalis europæa, Cornus suecica, Corrallorhiza innata, Sedum villosum, Oxytropis uralensis, Galium boreale, and Listera cordata. Some of them may occur just within the limits of the preceding region; but if so they indicate a close approach to the uplands; which are more decidedly marked by the appearance of inferalpine species, as Saxifraga aizoides, S. stellaris, Epilobium alsinifolium, Alchemilla alpina, Oxyria reniformis. The higher parts of Dartmoor, Exmoor, and the moors or low hills in the north-east of Yorkshire, and in the English counties bordering on Wales, may be referred to this region. Also the declivities and valleys of the Welsh and Lake mountains, of the Penine chain, and the higher hills in the Lowlands, together with the south-eastern bases of the Highland mountains, and the whole low country beyond the Grampians, from the shores to the height of 200 to 600 yds., according to situation. Examples may be given in Llanberris Lakes, Lyn Ogwen, and Lyn Idwell, in Caernarvonshire; Watendlath Tarn, and Sparkling Tarn, near the Scawfell Mountains in Cumberland. Loch Lomond, Loch Lubnaig, Loch Tay, Glen Clova, and Castleton of Braemar give an ascending series in the Highlands. The absolute elevation at which species grow is of little importance in this region. Their appearance or absence is more in connection with the proximity of their stations to high hills, or to the north-western coasts; the general result being a very rapid descent of upland plants towards the north and west coasts and the centres of mountain groups. Isolated hills or moors of 500 yds. in elevation, rising in the region of the plains (Dartmoor, Exmoor, Egton moor, &c.), scarcely show any upland species; but deep valleys lying between hills attaining 800 or 1000 yds. (Caernarvon and Cumberland) exhibit upland species almost down to the sea level. The name of *uplands* may hence appear not very happily chosen, but it sufficiently expresses the usual, although not the invariable position of the species. The upland species are always in the *upper* part of a line drawn from south to north, from flat to mountainous tracts, from low to high grounds. In particular situations the terms *boreal*, *inferalpine*, *submontane*, or *moorland* region might be preferred, but they would be less applicable generally.

"Wheat is cultivated only in the lower part of the region, and in the Highlands chiefly along the eastern coast. In the north of England this grain succeeds to 1000 feet, but in the middle or north of Scotland it appears doubtful whether it has proved worth while to cultivate it above 250 yds. Mr. Brand informs me that the statement respecting its cultivation up to 1000 yds. in Forfarshire (Headrick's Agricultural Survey) is erroneous. Oats and rye ascend higher than wheat, and some varieties of barley and potato, yet higher, close the scene of cultivation; which is fixed by Winch at 2000 feet in the north of England. But in point of fact this must apply very locally, for there is little cultivation beyond 500 yds. of elevation in Britain. The apple, cherry, strawberry, currant and gooseberry, especially the last, succeed pretty well. The hazel bears copiously. On the east coast of Sutherland the peach will ripen against walls with the aid of a glass sash, perhaps even without. Flax is frequently cultivated. In the higher parts of the region there is little cultivation, green close-nipped sheep pastures, swampy bogs, or dry heaths constitute the prevailing features of the landscape. Trees are now comparatively scarce, though once plentiful, and the land is chiefly devoted to sheep pasture, with little further attention from human industry than the occasional burning off the natural covering of Ericineæ, in order to produce a more grassy pasturage. It has here altogether the aspect of a country where man is feebly struggling against the natural barrenness of the soil and a deteriorated climate. The scattered spots, devoted to the cultivation of potatoes and barley, are insufficient to give a more cheerful look, but rather tend to make the surrounding barrenness more apparent. We are not, however, to suppose that the climate is here so very bad. These scattered patches of cultivation prove the contrary. But the scanty clothing of soil on the dry declivities, and the sterile and often swampy nature of that in the valleys and flattened places, make it useless to employ labour and capital on land, which cannot make a return sufficiently ample to compete with returns for expenditure bestowed on more productive tracts. In various parts of the upland region are highly cultivated and productive tracts, but such scarcely rise above the middle."

On distribution, in connection with lines of latitude and longitude—

"A correspondence between the extension of plants and the lines of latitude or longitude, viewed as a mere coincidence, presents nothing of interest; but where the former appears to be directly or indirectly dependent on the latter, it is much otherwise. We have seen that many species are found only at certain altitudes on the mountains, or in certain of the regions before described. Consequently, the mere fact of their existence under a given latitude in Britain is chiefly dependent on the extent and elevation of the mountains found there, and does not arise from the latitude or longitude. Were Britain a low plain throughout its whole extent, the distribution of plants, in correspondence with latitude and longitude, would doubtless be very different from that which is now seen under the diversified elevation and configuration of surface. Again, could we remove Britain ten degrees to the South or North, preserving the same physical features in every other respect, how greatly would the vegetation become changed!

"Latitude, longitude, altitude, and minor conditions, are so inseparably united in their influence over vegetation, that one cannot be considered apart from the others, with any reference to dependence or causation. The regions already pointed out, relate to the distribution of plants under these combined influences. The mere range of latitude for each species is attempted to be shown in the Appendix Table by naming the most southern and most northern degree under which I am aware of a station on tolerably good authority, and without any very strong reason for suspecting error. Several will probably be found to extend beyond the latitudes named for them, especially towards the extremities of the island; and in Scotland more than in England, in consequence of local botany being less attended to in the former country. It was wished to distinguish the ranges of latitude, in which species are indigenous, from those to which they have been introduced; but, after much labour, it was found necessary to abandon the attempt at present. The eager desire manifested by botanical collectors to call their specimens "truly indigenous," however small the evidence thereof, raises insurmountable obstacles.

"The above-mentioned Table does not include the *longitudinal range*. On account of the narrowness of Britain, its oblique position with reference to the poles of the earth, and the deeply indented coasts, no single meridian line divides the eastern from the western coasts; and in no other respect does the distribution of our plants appear to have any necessary connection with longitude, than as regards their tendency to the eastern or the western coasts. The mesial line of England and Wales, apart from Scotland, closely corresponds with 2 deg. W. long. from Greenwich, and entirely divides the eastern from the western coasts. The western boundaries of the counties Hants, Berks, Oxford, Warwick, Derby, York, Durham, and Northumberland, run nearly with this meridian. Hence these counties and all to the eastward of them may be called the *Eastern Counties*, while those lying to the westward will then be the *Western Counties*. According to the New Botanist's Guide, above a hundred species are limited to the eastern counties of England, and between sixty or seventy species are confined to the western counties, Wales included therewith. Nearly one half of these are peculiar to single counties, and the greater part of the rest occur only in two or three. Such, therefore, cannot with any sense of fitness be singled out as illustrations of the influence of longitude over vegetable distribution. Neither should introduced species be received as proper examples. The omission of all these very greatly reduces the number of eastern or western species; and increased knowledge will doubtless remove several of the following from the lists in which they are placed. Each is named under at least four counties, in the first volume of the New Botanist's Guide; that is, in so many counties of England or Wales."

Our last extract from this unassuming and excellent little volume, regards distribution in connection with geographical or local position.

"The distribution of plants in connection with *geographical position*, and the configuration or other peculiarities of the surface, merits particular attention, whether directly or indirectly caused thereby. Certain species extend over all Britain, from east to west, north to south, on the coast and inland. Some are spread over a definite and considerable portion of the island, but are altogether absent elsewhere. Others are so exceedingly local as to be found in single counties or stations only. And almost all intermediate degrees and kinds of distribution are exemplified by divers others. So soon as the necessary materials are collected, a sketch of the individual range and distribution of each species will be prepared. It is now, and probably will always continue, impossible to arrange them into groups rigidly accordant to their peculiarities of distribution, but some general types of vegetation, or geographic districts, may be pointed out, without attempting to fix precise limits. The following are suggested:—

"1st. *The Atlantic Type* embraces species found in the south-west of England or Wales; sometimes very locally, sometimes extending far along the southern or western counties, but rare or wanting on the east coast. Some plants of very limited geographical extension are common to this part of Britain, the west of France, and Portugal. Erica ciliaris, Sibthorpia europæa, Euphorbia Peplis, Bartsia, viscosa, and Pinguicula lusitanica may be given as examples of the Type.

"2nd. *The Germanic Type*, includes species chiefly seen in the south-east of England and counties adjacent to the German Ocean, running out more or less northwards and westwards. The chalk plants are referred to this type, but incidentally so on account of the chalk tracts lying in the south-east of England almost entirely. Phyteuma, Ophrys, Actinocarpus, are examples.

"3rd. *The English Type*, consisting of species chiefly or exclusively found in England, and decreasing in frequency northwards. Such are Acer campestre, Tamus communis, Iris fœtidissima, Orchis Morio.

"4th. *The British Type* comprehends species widely spread over Britain, and not exclusively prevailing in any particular part of it, as Bellis, Calluna, Corylus.

"5th. *The Scottish Type* is the opposite of the 3rd, its species being prevalent chiefly in Scotland or the north of England, and becoming rare or disappearing southwards. Trollius, Andromeda, Primula farinosa, Geranium sylvaticum are examples of it.

"6th. *The Highland Type* is composed of species either limited to the Scottish Highlands, or extending thence into the mountainous tracts of the north of England or Wales, but usually much less plentifully in the latter than in the Highlands. Examples occur in Salix herbacea, Azalea, Arbutus, Lobelia, Subularia.

"7th. *The Hebridean Type* contains a few species peculiar to the extreme north and west of Scotland, or at least chiefly seen there, as Ericaulon septangulare, Ajuga pyramidalis, Primula scotica.

"In the Tabular Appendix the different species will be referred to their respective types; but much liberty must be allowed in such reference. Many species are so extremely local, or so intermediate between the types suggested, that it becomes a doubtful question to which they should be assigned; while others give rise to the same uncertainty by partaking of the characteristic distribution of two or three. Thus, it appears doubtful whether Convolvulus sepium should be referred to the English or British Type; and Empetrum nigrum to the Scottish or Highland Type. Clematis Vitalba seems to unite the English and Germanic Types; Carum verticillatum hovers between the Atlantic and Highland types; and Pinguicula lusitanica joins the Atlantic to the Hebridean type. Attention to their distribution in other counties will assist decision in regard to some of the doubtful species.

"The *local distribution* of plants appears partly connected with some one or more of the before-mentioned conditions; partly in connection with peculiarities of soil, and partly on causes altogether unascertained. The very local occurrence of Erica ciliaris and Sibthorpia europæa would seem to be determined by the geographical position giving a peculiarly mild and maritime climate to the south-west of England. The prevalence of Orphrys apifera, muscifera, and aranifera, with other orchideous plants, in the south-east of England, is doubtless mainly owing to the chalk lands being there. Northern species found on mountains or moors, in bogs or rocky places, for the most part show a tendency to the western side of England, which might be anticipated from its more mountainous character and humid climate. But some species of the Highland type affect the north-eastern counties of England exclusively, in a manner not readily explained; such are Nuphar pumila, Carex pauciflora, Cornus suecica, Trientalis, and Linnæa. Except the last, these all occur in the west of Scotland, and there does not appear any evident cause to prevent their extension into the north-west of England and Wales. Many other species, of very local occurrence, equally baffle all attempts at explanation. Who can even guess why Cotoneaster vulgaris and Anthericum serotinum are limited to small portions of Caernarvonshire, or Astragalus alpinus and Oxytropis campestris to single rocks in Forfarshire; Avena planiculmis to Arran, or Physospermum cornubiense to the vicinity of Bodmin?"

Illustrations of the Botany and other Branches of the Natural History of the Himalayan Mountains, and of the Flora of Cashmere. Part VIII. By J. FORBES ROYLE, Esq., F.L.S. and G.S., M.R.A.S., &c. London: Allen and Co. 1835.

IN the eight part of this learned, scientific, and magnificent work, just published, there are many tribes of plants described, some of which, of course, are little known, and seldom heard of in our country. We shall extract some passages, which will convey a strong idea of the varied and full information here presented, whether its botanical, medical, commercial, or economical importance be considered.

"The *Apocynæ* abound in a milky juice, with which some acrid principle is frequently combined, rendering the whole suspicious and many highly dangerous; but owing to the absence of this acrid principle, the milk of some is of an innocuous nature, as exemplified in the milk-tree, or *Hya-hya*, of Demarara, referred to this order and called *Tabernæmontana utilis* by Mr. Arnott. (Lindley, Nat. orders, p. 214.)

"This milky juice is frequently of a tenacious nature and abounds in caoutchouc. Thus, in Sumatra, *Urceola elastica* yields that substance as a *Vahea* does in Madagascar, and birdlime is prepared from the *Voacanga;* as in India from species of *Ficus*, some of which, especially *F. elastica*, yield caoutchouc. It is, probably, owing to the presence of this principle, that some of the species are, in this and the kindred family of *Asclepiadeæ* indebted for the tenacity of their fibre, as *Nerium piscidium*, *Marsdenia* (*Asclepias*, Roxb.), *tenacissima*, &c. *Willoughbeia edulis* also yields caoutchouc, but of indifferent quality (Roxb.) Several yield good timber, as *Wrightia coccinea*, which for its lightness and strength is used in making palanquins in the South, while in the North of India that of *W. mollissima* is used by turners; *Holarrhena pubesceus* (*koora*), yields light wood, and species of *Strychnos* some of superior quality. The bark of some is astringent and febrifugal as that of *Wrightia antidysenterica*, called *Conessi*, and which has been introduced into European practice. Both the bark and seeds have long been employed by the Asiatics, and are the *Tiwaj* and *lissan-ool-asafeer* of the Arabs, who assign to it the Greek name of *andursaroon*. The Hindoos call it *indurjuo*, and distinguish the seeds by the name of *indurjuo shereen* (mild), from those of *Holarrhena antidysenterica* and *pubescens*, which they call *indurjuo tulkh* (bitter). The name *koora*, applied in different parts of India to these three plants, the two last being substituted for *Wrightia antidysenterica* where this is not indigenous, is evidently the *Coru* or *Cura* of Crist. d'Acosta (*Clusius. Exot.*, p. 265), of which the Malabar name he informs us is *Curodapala* (Codagapala? Ainslie Mat. Ind. 1. p. 88), a tree with pinnate leaves and milky juice, of which the bark is much used on the Malabar coast in affections of the bowels. *Ichnocarpus frutescens* is one of the plants sometimes used as a substitute for sarsaparilla, and *Ophioxylon serpentinum* has derived its specific name from its employment in snake bites: by Dr. Horsfield it is described as febrifugal and a valuable remedy in various disorders.

"The presence of the acrid principle, however, in a greater or less degree, renders many of the *Apocyneæ* highly dangerous, as the *Oleander*, known from ancient times; as it is the *νηριον* of the Greeks, corrupted in India into *sirion*, as *dufle*, its name in Avicenna, is probably a corruption of *Daphne*. *Nerium piscidium*, Roxb. also contains a principle dangerous to fish in the water where it is washed, for the sake of its tough fibres. *Vinca parviflora* is applied in India as an external stimulant in cases of lumbago. Some of the species of *Plumieria* are used in diseases of the skin; and others, as *P. acuminata*, *alba*, and *obtusa*, rank in Java as purgatives; probably in consequence of their acrid nature. The *Cerberas* are, however, of a much more dangerous nature, though the leaves of some are also employed as purgatives, as of *C. Thevetia* and *Manghas;* but the seeds of the latter are described as narcotic: and *C. Tanghin* (*Tanghinia veninifera*, Pet. Th.), the tanghin tree of Madagascar, is so powerful a poison that a single seed is said to be sufficient to destroy twenty persons. (Bot. Mag. 2968.)

"The *Asclepiadeæ*, like their allies the *Apocyneæ*, abound in a milky juice, which is, however, less acrid in nature, as a greater proportion of the family are innocuous, some edible, several useful as medicines, and few known as poisons. It is more than probable that caoutchouc is contained in several, as *Cynanchum ovalifolium*, according to Dr. Wallich, (Asclep. Herb. No. 82) yields excellent caoutchouc at Penang; the tenacity of some species may be owing to its presence, as of *Marsdenia tenacissima*, employed for bowstrings by the mountaineers of Rajmahl; the fibre of this plant and of *Urtica tenacissima* were the strongest Dr. Roxburgh ever met with. Another plant of this family, *Orthanthera viminea*, attaining a height of ten feet, is also remarkable for the length aud tenacity of its fibres. This grows luxuriantly along the foot of the mountains, and its long, straight, leafless, slender, and wand-like stems, point it out as seemingly well suited for rope-making. Like the *Apocyneæ* here also some plants yield indigo of excellent quality, as *Marsdenia tinctoria*, found in Silhet; and as the plantation, like that of *Wrightia tinctoria*, has the advantage of being permanent, it might be well suited to some parts of India. *Gymnema tingens* is also used in dyeing.

"Of the innocuous plants may be mentioned the *Stapelias* of the Cape; *Gymnema (Asclepias) lactiferum* is said in Ceylon to yield a mild and copious milk; *Sarcostemma brevistylum* (*Asclepias acida* and *aphylla*, Roxb.), a milky juice of an acid nature, which is taken by the natives to quench their thirst. (Roxb.) Cattle eat the roots of *Oxystelma esculentum;* wild hogs those of *Ceropegia bulbosa* (Wight), and men every part. (Roxb.) So *Pergularia edulis* and *Periploca esculenta* are described as being edible; as *Asclepias stipitacea* and *spiralis* are said by Forskal to be in Arabia. Owing, however, to the presence of an active principle, some of the species are employed in medicine, as *Asclepias decumbens* and *tuberosa*, for diaphoretics in America: so in India *Tylophora* (*Asclepias*, Roxb.) *ashmatica* has been considered an efficient substitute for ipecacuanha, and an excellent remedy in dysentery. *Hemidesmus indicus* (*Asclepias pseudosarsa*, Roxb.) is considered by the medical officers on the Coromondel coast as an efficient substitute for sarsaparilla in the cure of syphilis, scrophula, and cutaneous affections, while *Secamone emetica* (*Periploca emetica*, Retz.) probably contains a greater proportion of the acrid principle, as it is emetic in its action, as are *Asclepias curassivica* and *Vincetoxicum*, *Cynanchum tomentosum*, &c. Others, however, of the *Asclepiadeæ* act as purgatives, as *Cynanchum Arghel*, of which the leaves are employed to adulterate senna; *Cynanchum monspeliacum*, said to yield French scammony (Fée), as *Periploca Secamone* (*Secamone* of Prosper Alpinus from the *Sukmoonya* of the Arabs), does that of Smyrna, *Asclepias syriaca* is acrid and caustic, and *Periploca græca* is described as being acrid and poisonous.

"Valuable as it is probable that some of this family will prove as medicinal agents, the *Mudar*, *Calotropis* (*Asclepias*, Auct.) *gigantea* is the only one that has yet attracted any attention in Europe. This has long been employed as an article of the Indian Materia Medica, by the native practitioners, with their many other efficient remedies. It is called *Arka* and *Akund* in Sanscrit, and *Ashur* by the Arabs; it is the *Ak* and *Mudar* of the Hindoos, to which *jumakioos* is assigned as a Greek name. From the united testimony of Europeans and natives, there is no doubt of its being a powerful alterative in leprosy, elephantiasis, &c. (v. Ainslie, Mat. Ind. 1. p. 486.) From this plant Dr. Duncan obtained 'Mudarine, which possesses the property of coagulating by heat, and becoming again fluid on exposure to cold.' Wight, l. c. Another, but a less known product, is obtained on the Mudar, or some nearly allied species, probably the *Calotropis procera* of Persia: this is a sweetish exudation formed on the plant in consequence of the puncture of an insect called *gultiyal*; the substance is called *sukkur-ool-ashur*, and *ak* or *mudar-ke-shukur* (sugar.) The species most common in the northern provinces, and nearly allied to the Persian *C. procera*, is *Calotropis Hamiltonii*, of Wight, which obtains among the natives the same names as *C. gigantea*: it possesses also many of the properties of that species, as I have proved from prescribing it in cases of incipient leprosy and cutaneous affections, in the civil and military hospitals at Saharunpore.

"It is much to be desired that these experiments should be repeated and others instituted, on the plants of this as well as of other families, for I have no doubt that, with a diminution of the prejudice in favour of things brought from a distance, it will be found that India is capable of producing, and does produce, many as efficient as those which have to make a series of voyages before they can be brought into use. For it must be allowed that the climate is favourable for the production of drugs of the most energetic nature, as may be witnessed in the *Nux vomica*, the *Aconitum ferox*, opium, bhang, datura, &c. among narcotics; croton tiglium, jatropha, castor-oil, turbith, and senna as cathartics; among tonics and febrifuges, the rohuna (*Soymida febrifuga*), kutkurunja (*Cæsalpinia Bonduc*), which has long maintained its station in the Materia Medica of the East, with the gentian, cheretta, creyat, and several others as bitters; the catechu, kino, &c. as astringents, and innumerable mucilaginous demulcents. It is improbable, therefore, that India should be deficient only in those of which the physical properties being less obvious, and the effects on the human system less decided, require for their discovery and ascertainment nicer powers of discrimination. But as numbers of the medical establishment possess the requisite qualifications, it is to be hoped that some may be induced to investigate the properties and powers of the Indian Materia Medica. The sensible properties will frequently yield considerable assistance, while the natural affinities of the plants will shew the strong probability of their possessing much the same powers as some of their congeners: at least, the experience of the natives will often give assurance to the inferences we may have deduced, and confidence in prescribing a new medicine, by attending to the doses in which they themselves are in the habit of administering it. Chemical analysis, finally, will reveal the hidden principle, and enable us to dispense with the great mass of vegetable matter which is now prescribed for the sake of a few grains of energetic principle. Perseverance in such a course for a few years will not only increase the present resources of medical officers wherever they may be situated, but by attaching a definite character to many of the articles they now employ, will give them value in Europe; insure to some of them importance as commercial articles; and have, at the same time, a result not less important to a philanthropic mind, that of placing within the reach of the immense native population, a better defined selection of efficient agents from their heterogeneous mass of materials than their scientific attainments will at present enable them to select. A result which will be appreciated in proportion to the improvement of the education of the native doctors now taking place under the auspices of government; the effects of which will, in India as elsewhere, descend lower and spread wider with the lapse of years."

Under the Solaneæ, which contain many plants as articles of diet, or for other uses in medicine, or for giving rise to an extensive commerce, we have the following observations.

"But a plant, second hardly to any in point of importance in furnishing food for man, requiring also the same climates, has been introduced into the same countries. This is the potato, for which India, as well as the rest of the Old World, is indebted to the New World. It has been found in a wild state in 33 deg. of S. latitude in Chili, in the mountains near Valparaiso and Mendoza, and also near Lima, Quito, and Santa Fé de Bagota; but in these situations it is supposed to have escaped from a state of cultivation, as the illustrious Humboldt argues that it must have travelled north in 'the course followed by the Incas in their conquests.' But as it was introduced into England from Virginia in 1586 by Sir W. Raleigh, and not known to the Mexicans in the time of Montezuma, he concludes it as probable, that if the English colonies did not receive it from South America, this plant was originally wild in some country of the northern hemisphere, as it was in Chili. This conjecture has been singularly confirmed by the potato being found wild on the Pic d'Orizaba by Deppe and Schiede. (D. Don).

"The potato, we are informed by Dr. Ainslie, was introduced into India from the Cape of Good Hope, and some of excellent quality are produced in the Mysore country, particularly at Bangalore and Nundydroog. They are grown all over India (Roxb.), and of a very fine quality in the cold weather, or from October to March, along the plains of India from Patna to Loodiana. Dr. Wallich states that 'they are planted in the valleys and lower hills of Nepal, so as to afford fresh crops all the year round: the roots are planted in February, June, and November, and gathered after three months.' They were introduced into the northern mountains, and grown in the neighbourhood of Simla, at an elevation of near 7,500 feet; and by Major Young, on the mountains north of Deyra, at an elevation of 6,700 feet; so that Mussooree made its first appearance on the map by the name of the Potato Garden. Their quality was subsequently much improved by Captain Townsend raising some from seed, which in the third year became of enormous size, and of very good quality. They are now becoming very generally cultivated, both in the hills and plains of Northern India; and it is fortunate both for sellers and consumers that those grown in the former come in when the others are going out of season. Potatoes are in some places becoming adopted as food by the natives of India, though more slowly than could be wished; at this we need not be surprised, as even in France their use was not generally adopted until after their introduction into Europe more than two hundred years, and then only owing to the persevering efforts of the philanthropic Parmentier, round whose tomb, in Pere la Chaise, they are now yearly planted.

"Indebted as India is to the New World for the capsicum and potato, there is yet another plant, which, though not to be compared with the last in real importance, is still more valuable as an article of commerce. This is the tobacco, which from being the solace only of the red American, has become one of the luxuries of the rich, and almost a necessary of life for the poorer inhabitants of a great portion of the globe. The Hindoo, slow to adopt strange customs, has been caught with the general infection; and though some religiously abstain from its use, their nobles, as their women, may be seen inhaling it in the midst of perfumed essences, while the labouring bearer and hard-working boatman seem to derive fresh vigour from their ever-in-hand hooqqas: the mountaineer, finding it inconvenient to carry such an apparatus over his rugged roads, makes a hole in the ground, through which he smokes.

"The Spaniards are said to have first become acquainted with the tobacco in the West Indies. The name by which it is now known was that used in the Haytian language to designate the pipe used in smoking the herb, which by the Mexicans was called *yetl*, and by the Peruvians *sayri* (Humboldt). It was first cultivated near Lisbon about 1560; and introduced into England in 1586 by Sir Walter Raleigh and his companions. It early attracted the notice of the English settlers in Virginia, especially after the founding of James Town in 1607. Shortly after this, it appears that tobacco was introduced in lieu of specie, as the tavern-keepers were compelled to exchange a dinner for a few pounds of tobacco, and government offices were paid in the same commodity (Tatham, p. 180); Malte Brunc, quoting from Morse, states that, about 1619, on the arrival of a fresh body of emigrants, 150 young women were sold to the planters as wives, at 150lbs. of tobacco each. In the native annals tobacco is described to have been first taken to Java in 1601. In Persian works on Materia Medica, it is stated to have been introduced into India in A.H.

1014 (A.D. 1605) towards the end of the Sultunnut of Jelaladeen Akbar Padshaw. This is confirmed by a proclamation of Jehangeer, who succeeded in July of that year. From India tobacco was probably taken to the Malayan Peninsula, and perhaps to China; but Pallas, Rumphius, and Loureiro, are of opinion that in China the use of tobacco is more ancient than the discovery of the New World.

"That it is not owing to any inherent defect in the climate of the British possessions in India, that the tobacco is of such inferior quality, I am happy to be able to prove by extracts from official documents, with which, owing to his kindness and anxiety to assist in improving the resources of India, I have been favoured by Mr. William Johnson, of the East-India House. First, with respect to that which obtained considerable repute under the name of Martaban tobacco, Dr. Wallich states, that 'the sort is from Arracan and not from Martaban;' and describes it as having 'a fine silky leaf: tried by many people, it had been pronounced the very best they had ever tasted, equal to, nay, surpassing the finest imported from Turkey and Persia.' An extensive tobacconist says, 'a finer and better flavoured tobacco he never saw or tasted in his life.' One of the first brokers in the City says, 'the sample of leaf tobacco is certainly of a very fine quality, and appears to have been produced from some peculiar seed, and a greatly improved cultivation and care.' By many manufacturers 'it was supposed to be from the seed of Havannah or St. Domingo tobacco.' For smoking, it is compared with Maryland tobacco, having the same qualities, 'except the flavour, which is better, and more like Havannah.' The colour and leaf are moreover pronounced excellent for cigar-making; but if anything is against it for that purpose, it is the largeness of the principal stalk, and coarseness of the small fibres in the leaf.' The commercial gentleman by whom the tobacco was transmitted to the brokers, pronounces it very superior, and the leaf as very fine, adding, that the price of 6*d*. or 8*d*. might readily be obtained, perhaps more, with the improvements suggested.

"As it is interesting, if possible, to ascertain the peculiarities of climate and country where so superior an article is grown, we have a communication from Mr. R. Hunter, the gentleman who brought the tobacco from Arracan, who states that 'the Sandowee tobacco grows on the sloping banks of rivers not overflowed while the crop is on the ground, but inundated during the rains. The best is that grown above the influence of the tides, about thirty miles from the mouth of the river. The ground receives apparently great attention in cleaning and in breaking the clods. The tobacco is all transplanted about November, and the crops are cut about March.' Here we see the coldest season is selected for the cultivation: with respect to climate, it may be inferred from the province of Arracan extending along the western side of the Bay of Bengal, and included between the coast and a range of mountains, that it must have alternations of temperature, and of land and sea breezes; and that though Arracan Proper is low, inundated, and shut in by low hills, at Bassein the climate is described as neither oppressive nor unhealthy from November to May (Encl. Met. Pegu), and Sandoway as mountainous, and not subject to inundations, enjoying a cool sea breeze, and temperate nights nearly through the year. It is, however, probable, that the superiority of the tobacco is owing to careful cultivation and care. This was probably taught by Europeans, as Arracan was the seat of a Roman Catholic mission in the beginning of the seventeenth century. It is pleasing to find here, as in the vicinity of Ormuz, the arts continuing to benefit a country long after the conquests of those who introduced them have passed away.

"Of other tobaccos which have some repute in India, Dr. Ainslie states, that 'the finest kinds in India, and perhaps in the world, is grown near the villiage of Woodanum, in the Northern Circars,' 'and in some of those low sandy islands formed at the mouth of the river Krishna (from which is made the famous Masulipatam snuff); also in the Delta of the Godavery, where the soil is peculiarly rich and fertile.' Dr. Wallich, in his evidence before the Committee of the House of Commons, states that some excellent tobacco was grown at Bogsipore, from Havannah seed, and that some very esteemed kind is grown in Bundelcund. The tobacco of Chunar is celebrated in India, as is more especially that of Bhilsa, of which a great portion I am informed by Dr. Moore, is sent away in presents by the Rajah of Nagpore. It is to be regretted that we are unable to ascertain the commercial value of any of these, as they do not appear to have been sent to the English market. The only exception is that mentioned by Mr. Ritchie, of one bale of the fine tobacco grown in the northern districts of Bombay selling for 6*d*., while American sold for 5*d*.; but the average of the experimental exportation being found defective in the curing, sold only for 1*d*. and 2*d*., and did not pay, as is frequently the case with importations of tabacco from Bengal and Bombay.

"Such appears to have been the state of the ordinary Indian tobacco, when the East India Company determined on endeavouring to induce cultivators to improve the culture of tobacco by importing seed from Maryland and Virginia, which was to be freely distributed to those inclined to make experiments on the subject.

"These experiments, I regret to say, seem, with one exception to have been undertaken only in the southern parts of India, at least it is from thence only that samples have been sent to the India House. Importing seed from 35 deg. to 40 deg., and with territory from 8 deg. to 32 deg. of North latitude, elevated from 0 to 13,000 feet above the sea, it is greatly to be lamented that experiments should have been confined to between 12 deg. and 16 deg., that is, to the districts of Cuddapah, Guntoor, and Coimbatore. The object being to get an article similar in properties to that already esteemed in the market: the plan would be to make the first attempts, as failure is so apt to discourage, in the soil and climate most like that whence seed is procured. Though the above districts may by a different treatment be enabled to grow very good tobacco, there is no doubt that the soil was either too rich for the Virginia seed or the climate too moist and warm, or perhaps both conjoined, for the plants have grown so luxuriantly, that the stalks and fibres have attained a size and coarseness, fitting them better for twisting into cables than for putting into a pipe. One cultivator, indeed, states that the plants grew so well, as to be twice the size of the country plants. The tobacco was besides so badly packed, and worse cured, that the brokers describe the different samples as 'too dark in colour,'—'thick and coarse grown,'—'nearly all stalk;'—and when the leaf is well grown, it is pronounced 'over large, with a thick coarse stalk,'—'unpleasant or musty in flavour,'—'worm-eaten,'—'not properly cured,'—'packed in a damp state,'—and that, as articles of commerce, they are 'not marketable,'—or 'of no value;' and of the best it was said, that some tobacco from Holland of much better quality, had been sold under 2*d*. per pound.

"These facts are sufficiently discouraging, and were it not for the author's confidence that they are the necessary result of inattention to principles, it might perhaps be considered more prudent to withhold them when recommending a new culture. But as others might commit the same mistakes, it is proper at once to meet the difficulty, that we may at the same time suggest a remedy. Besides, the tobacco of Arracan and that from Bombay has shown that even without the aid of foreign seed, some of very superior quality may be grown in India; while the following facts prove that by careful management Virginia seed may be made to yield a good crop, even in the rich soil and climate of Bengal. This tobacco was imported in the Sir T. Munro, and produced from Virginia seed sown in the garden of the Agricultural Society of Calcutta:—'the method pursued in its cultivation and preservation is that generally adopted by the Americans.' This specimen was submitted by the Court of Directors to the examination of some dealers and manufacturers in London, who pronounced it to be 'the best sample of Indian tobacco they had ever seen. In flavour and general appearance of the leaf, it approaches the descriptions which are usually selected here for manufacturing into cigars, and for smoking in a pipe, viz., Havannah, St. Domingo, and Ameersfoortq (Dutch): all of which command high prices in relation to other kinds of leaf tobacco. A portion of this sample has been made into cigars here, which are much approved; and it is probable that if a moderate supply of tobacco of the like quality were in this market, it might be in some request for making into cigars, and would come into competition with the tobacco of St. Domingo, which is at present worth from 6*d*. to 8*d*. per pound in bond.' "

DESCRIPTION OF THE PLATES.

CYRTANTHUS OBLIQUUS.

OBLIQUE-LEAVED CYRTANTHUS.

Hexandria Monogynia.

Amaryllidæ.

Gen. Char.—Corolla tubular, club-shaped, crooked, six-cleft; segments ovate, oblong; filaments inserted into the tube, converging at top.

Spec. Char.—Leaves flat, oblique, flowers pendulous.

Bulb tunicate; leaves several, coriaceous, lorate, obliquely twisted, blunt, distich, with their flat surfaces opposed, glaucous, upright, dividing, about a foot and a half high, two inches bread; scape central, upright, round, slightly compressed, from one to two feet or more high; spathe bivalved; umbel many-flowered; peduncles recurvedly reflexed, intermixed with membranous bracteas, shorter than the corolla, which is cernuous, funnel-form, tubular, somewhat fleshy and firm, of a yellowish colour, variegated with orange red and green, about three inches long. Germen green, oblong, subtriangular, shorter than peduncles; stamens of one length, reaching to the base of the segment, for about half way, decurrently adnate to the tube; anthers oval, oblong, perpendicular; style rather longer than stamens, ending in an inconspicuous subpubescent capitolate stigma.

It makes a fine appearance when in bloom, but has no scent; requiring plenty of water when in a growing state, but scarcely any when dormant. The flowers appear in May and June. It is a native of the Cape of Good Hope, requires the protection of the greenhouse, and is readily increased by offsets from the bulbs, or by seeds.

PÆONIA PERÆGRINA.

TURKISH PÆONY.

Polyandria Digynia.

Ranunculaceæ.

Gen. Char.—Calyx five-leaved. Petals five. Style 0. Capsule many-seeded like a pod.

Spec. Char.—Capsule downy, erect, segments of leaves three parted, cut and entire, ovate, lanceolate, flat, hairy beneath.

The roots are composed of roundish knobs or tubers, which hang below each other, fastened with strings; the leaves are composed of several unequal lobes, which are variously cut into many segments, of a pale green colour; the stalks rise to the height of ten or twelve inches, and are branched; the flowers have 5-8 petals of a bright crimson colour, not at all inclined to purple, but of an ordinary red tulip.

A native of the Levant; and though sufficiently hardy to bear our ordinary winters in the open ground, it is considerably more tender than the common paeony.

It flowers in May, and is propagated by parts of its roots, which multiply very fast. In parting these roots, always observe to preserve a bud upon the crown of each offset, otherwise they will come to nothing. The best season for transplanting them is towards the end of August, or the beginning of September; for if they are removed after their roots have shot out new fibres, they seldom flower strong the succeeding summer.

LINUM TRIGYNUM.

THREE-STYLED FLAX.

Peutandria Pentagynia.

Caryophyleæ.

Spec. Char.—Leaves elliptical, ovate, nearly entire —Styles 3, capsules 6-celled.

The stem is shrubby and much branched; branches round, smooth, leafy. Leaves alternate-smooth, dark green, tapering at the base into a shortish foot-stalk- Flower stalks clustered from the ends of the branches, and accompanied by lanceolate bracteæ. Calyx leaves ovate, acute, entire, ribbed smooth. Petals obovate, slightly notched, furnished with a small tooth on each side of their claws, and marked with longitudinal veins, as usual in the genus. Capsule green and juicy at first, brown when dry: generally of six cells; seeds solitary, very thin, and soon dried up.

This very handsome species of flax is a beautiful greenhouse shrub, flowering in July and August. Native of the East Indies.

Its provincial name is *Gul Ashorfee*, in allusion to its fine golden colour, from *Gul*, a flower, and *Ashorfee*, a gold coin current in India, of the value of 2*l*. sterling.

LINUM AUSTRIACUM.

AUSTRIAN FLAX.

Pentandria Pentagynia.

Gen. Char.—Flowers inferior. Petals five. Capsule of ten cells.

Spec. Char.—Sepals rounded, obtuse; leaves linear, acute.

The Austrian Flax is nearly allied to the *common* and the *perennial* Flax; it has, however, much shorter peduncles, and consequently a more compact panicle, which gives it a different habit. This difference is aided too by the peduncles being reflected whilst the flower is in bud.

It is a hardy perennial, flowers in June and July, and may be propagated by parting its roots.

OXALIS RUBELLA.

RED-FLOWERED OXALIS.

Decandria Pentagynia.

Oxalidæ.

Gen. Char.—Sepals five, distinct or united at base. Petals five. Stamens united at base, the five outer shortest. Style five, pencil-shaped or capitate at end. Capsule oblong, or cylindrical.

Spec. Char.—Leaflets linear, cuneate; peduncles much longer than the leaves; bracteas remote from calyx; styles intermediate.

Bulb ovate, the size of a hazel nut, with a ferruginous loose skin; stem round, slender, somewhat hirsute, about half a foot in length, brownish purple; peduncles axillary, solitary; leaves ternate; leaflets half an inch long, somewhat rough-haired at the edges; calycine leaflets lanceolate, green, with the edges purple at bottom; corolla several times longer than the calyx; claws erect, twice as long as the calyx, yellow; borders obovate, purple above, underneath pale purple, with one side yellow; filaments connate at the base; germen pale green.

Oxalis *hirta*, *rosacea*, and *rubella*, are very nearly allied, perhaps too much so to be properly considered as distinct species. If they are to be distinguished, our plant having obtuse petals, must be referred to the latter. It is a native of the Cape of Good Hope; requires the shelter of a greenhouse. In Europe it flowers from October to December, and is propagated by tubers.

SCUTELLARIA GRANDIFLORA.

LARGE-FLOWERED SKULL-CAP.

Didynamia Gymnosperium.

Labiatæ.

Gen. Char.—Calyx entire; after flowering closed with a lid. Tube of the corolla elongated.

Spec. Char.—Leaves cordate, cut, crenate, pubescent on each side, shorter than footstalk, spikes short, four-cornered.

This species approaches very near to *scutellaria orientalis*, but differs in having much shorter spikes, corolla larger in proportion to the size of the bracteæ, leaves rounder, less tomentose underneath, but soft like velvet on both sides; the flowers are scentless, and as well as the whole plant, intensely bitter.

It is a hardy perennial; native of Siberia; flowering in July, and is readily increased by dividing the root, or by seed.

ERYTHRONIUM AMERICANUM.

AMERICAN YELLOW-FLOWERED DOG'S-TOOTH VIOLET.

Hexandria Monogynia.

Tulipaceæ.

Gen. Char.—Corolla six-petalled, bell-shaped. Nectary tubercles two, fastened to the base of the alternate petals.

Spec. Char.—Leaves ovate.

Bulb solid, ovate, pyramidal, about the size of a filbert, covered with dark brown membranous coats; leaves coriaceous, glaucous green, variegated with liver-coloured blotches, (when looked at through a magnifying-glass, are found to be shagreened or roughened by minute pointed tubercles) standing on narrow convolute petioles, the one of which envelopes the other, while both sheath the lower part of the one-flowered naked scape, with which they are concrete below; corolla deep yellow; outer segments broader and more reflex; filaments inserted between the base of the pistil and that of the corolla, upright, linear, flat, submembranous, adpressed to the germen, longer than the anthers, which are yellow, style green, trifoliate, triquetrally clavate, surmounted by a triangular stigmatose opening, pubescent within, projecting beyond the stamens.

Native of North America, flowering in April and May. It is very hardy, and readily increased by offsets from its bulbous roots.

AMARYLLIS RETICULATA.

NETTED VEINED AMARYLLIS.

Hexandria Manogynia

Amaryllideæ.

Gen. Char.—Flower nodding, irregular, funnel-shaped, ringent; filaments delicate, unequal in proportion, and direction; seeds flat, numerous.

Spec. Char.—Leaves several, lorate-oblong, narrow towards the base; flower cernuous, cucullate, tubular, obliquely ringent.

This species is distinguished by the petals being transversely veined, and by the smoothness of the throat. The sheath is many-flowered. Blossom purple. Native of Brazil, flowering in May.

To ensure the flowering of this plant, it is necessary to plunge the pot in the heat of the bark-bed of the hot-house; and during the winter months, to keep the earth rather dry, as the bulbs are very subject to rot without that precaution. It should be planted in a composition of old rotten dung or leaf mould, and a small proportion of loam.

LONICERA IMPLEXUM.

MINORCA HONEY-SUCKLE.

Pentandria Monogynia.

Caprifoliaceæ.

Gen. Char.—Calyx four-five toothed, or entire; Tube of corolla long, with a five cleft regular, or two-lipped limb. Stamen length of corolla. Stigmas globose. Berry distinct three-celled, many-seeded.

Spec. Char.—Flowers capitate, terminal. Leaves ever-green, all distinct.

The Minorca honey-suckle approaches very near to the common woodbine, differing principally in having small evergreen leaves, which on the lower part of the plant are narrower, with straight sides; branches intricately interwoven; whorls containing fewer flowers; tube of the corolla straighter and segments of the limb shorter in proportion. The flowers are pale coloured, streaked with red, white within, when fruit expanded, but changing to yellow.

If less showy than some other species, it certainly yields to none in fragrance, and blossoms abundantly from Midsummer to Michaelmas.

It is hardy, but thrives in a sheltered situation. May be propagated by cuttings, as other honey-suckles are.

THEOBROMA CACAO.

SMOOTH-LEAVED CHOCOLATE-NUT.

Polyadelphia Decandria.

Byttneriaceæ.

Gen. Char.—Calyx five leaved. Petals five. Nectary urceolate, with five horns; filaments five, each with two anthers; style filiform. Stigma five-parted. Capsule five-celled, without valves. Seeds in a buttery pulp.

Spec. Char.—Leaves entire smooth.

The Chocolate-nut tree grows in a very handsome form, to the height of 12 or 16 feet. The trunk upright, and about as high as a man before the head spreads out; the wood is light and of a white colour, and the bark is brownish and even. Leaves bright green, from 9 to 16 inches long, and 3 or 4 inches wide. Peduncles slender, about eight or ten together, chiefly from the scars of the fallen leaves. Flowers small, reddish, yellow, inodorous. Fruit smooth, yellow, brown, or red, or of both colours, about three inches in diameter; rind fleshy, near half an inch in thickness, flesh-coloured within; pulp whitish, the consistence of butter, separating from the rind in a state of ripeness, and adhering to it only by filaments, which penetrate it and reach the seeds. Hence it is known when the seeds are ripe, by the rattling of the capsule when it is shaken.

The pulp has a sweet and not unpleasant taste, with a slight acidity; it is sucked and eaten raw by the natives; it may be easily separated into as many parts as there are seeds, to which it adheres strongly, and they are wrapped up in it, so that each seed seems to have its own proper pulp. The seeds are about 25 in number; when fresh they are of a flesh colour; gathered before they are ripe, they preserve them in sugar, and thus they are very grateful to the palate; they quickly lose their powers of vegetation, if taken out of the capsule, but kept in it they preserve that power for a long time. A tree yields from two to three pounds of seed annually.

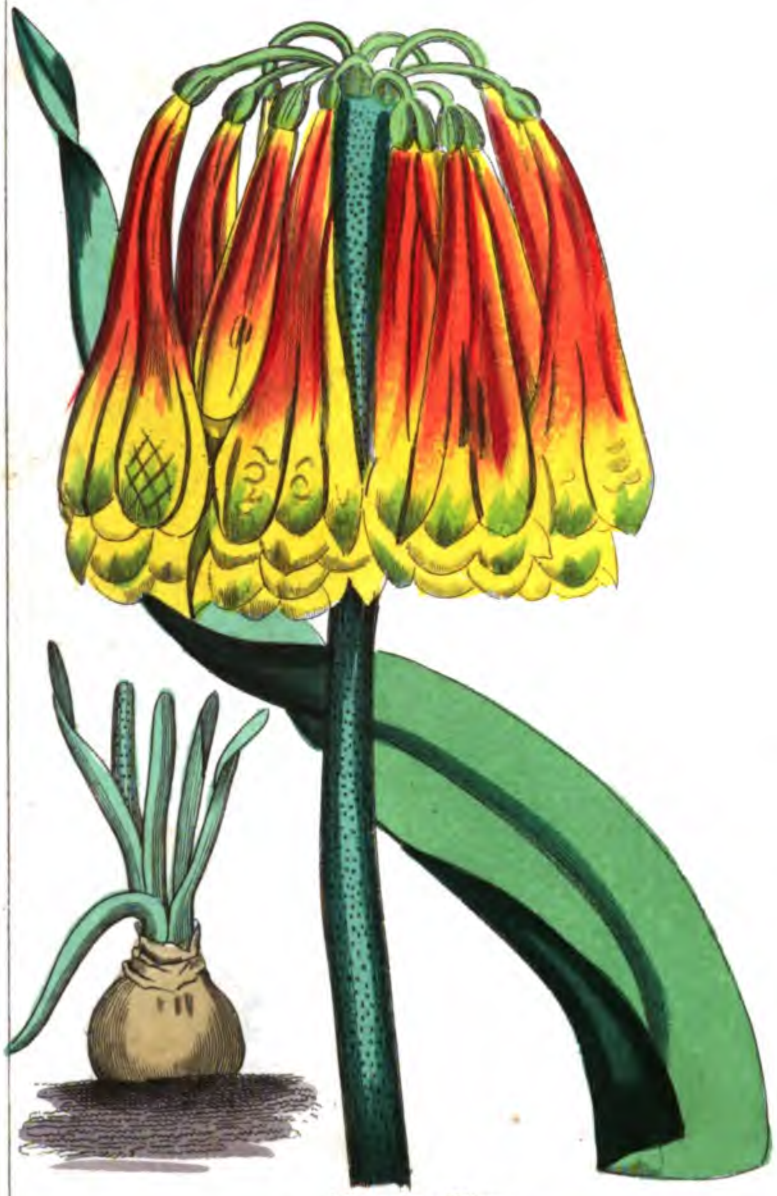
The tree bears leaves, flowers, and fruit all the year through; but the usual seasons for getting the fruit, are June and December.

Chocolate is remarkably nourishing and agreeable to most people, which occasions it to be commonly kept in most houses in America, as a necessary part of the provisions of the family.

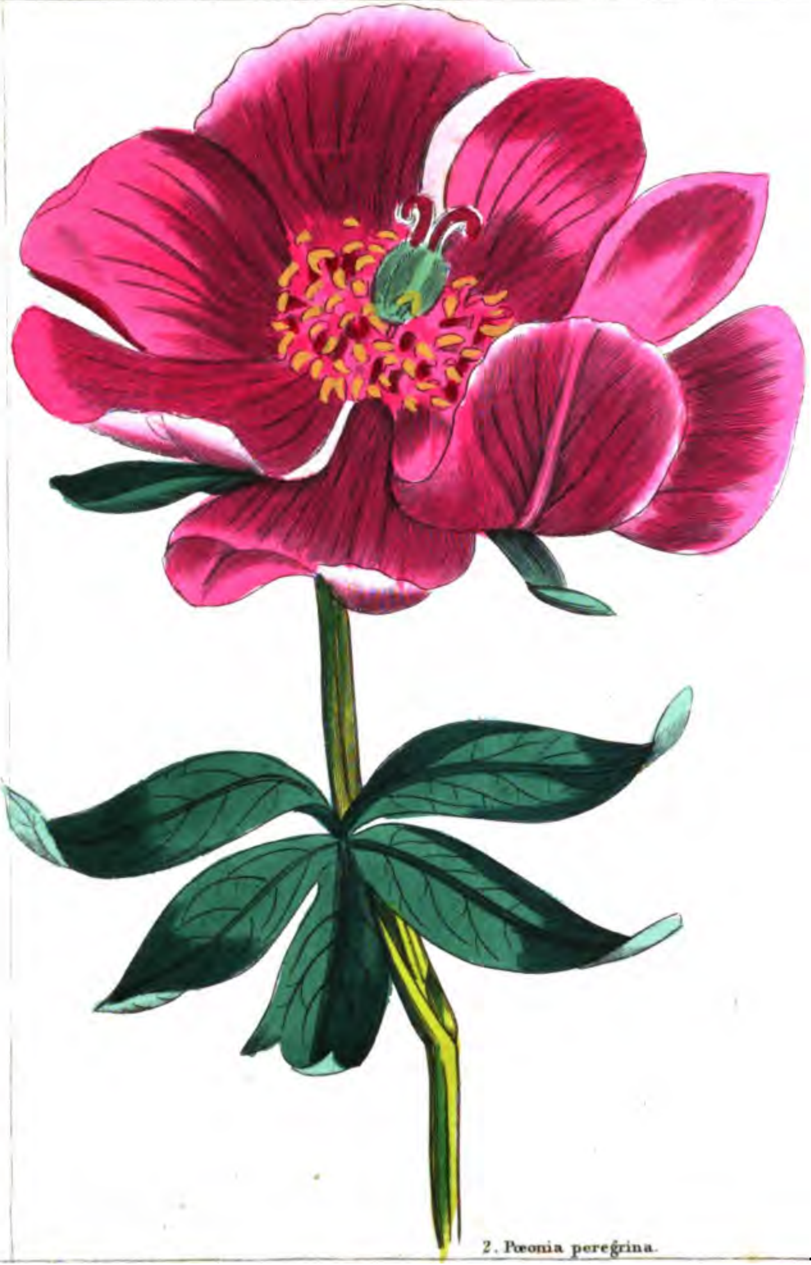
The seeds are generally ground or pounded very fine, a little arnatto added, and made into paste; they are much charged with oil, but mix well with milk or water, and are formed into rolls of one pound each.

It is in daily use amongst most families in Jamaica, where the tree is largely cultivated, and affords a nutritious food for children, as well as adults.

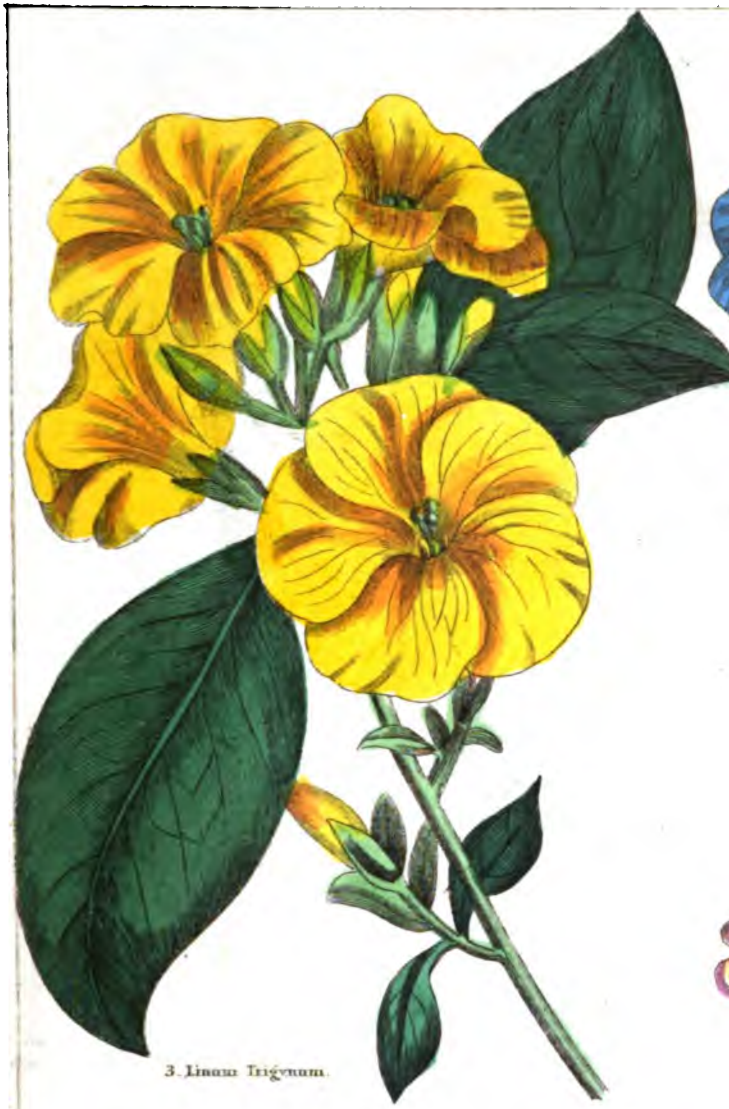
In our stoves Theobroma thrives in light rich soil, and cuttings root in sand under a hand glass.



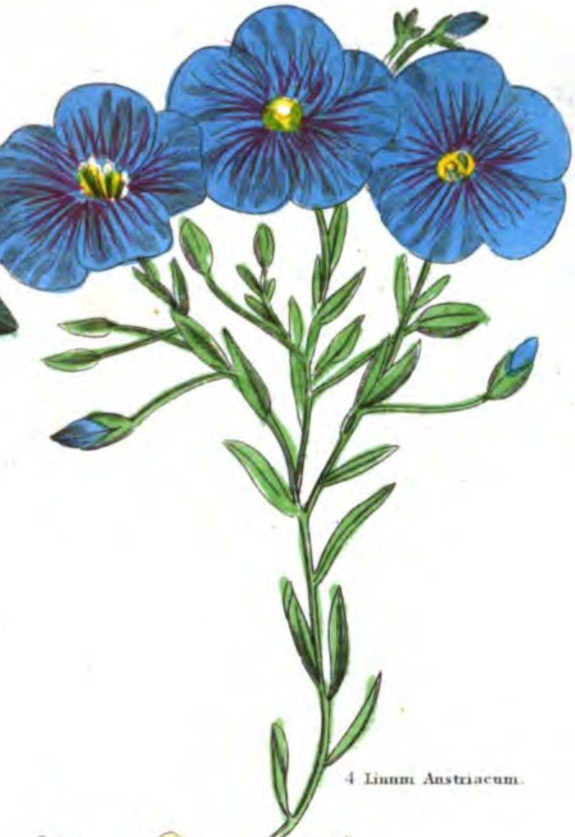
1. Cyrtanthus Obliquus.



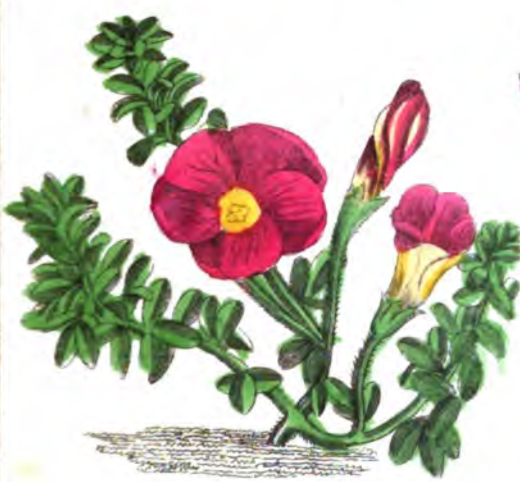
2. Pæonia peregrina.



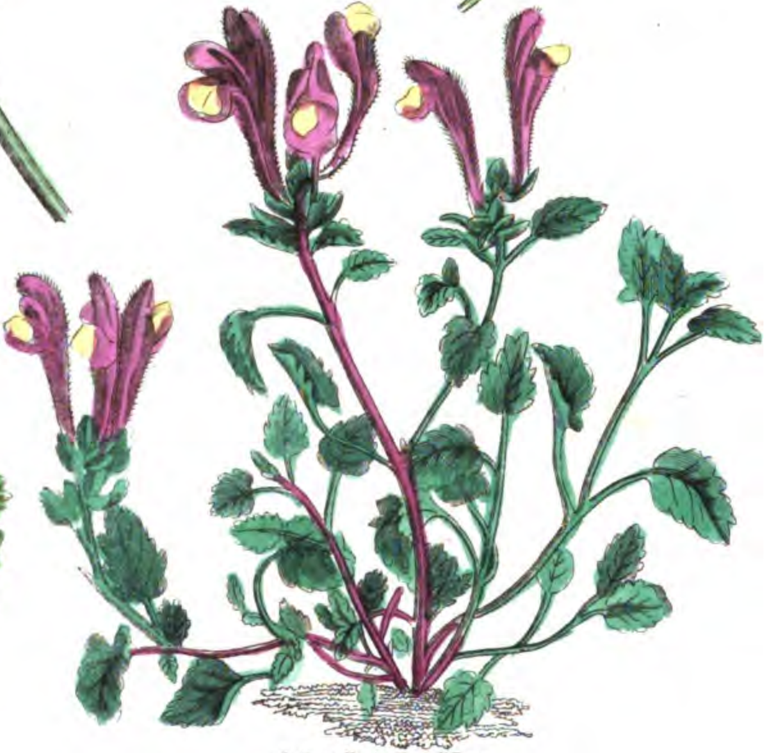
3. Linum Trigynum.



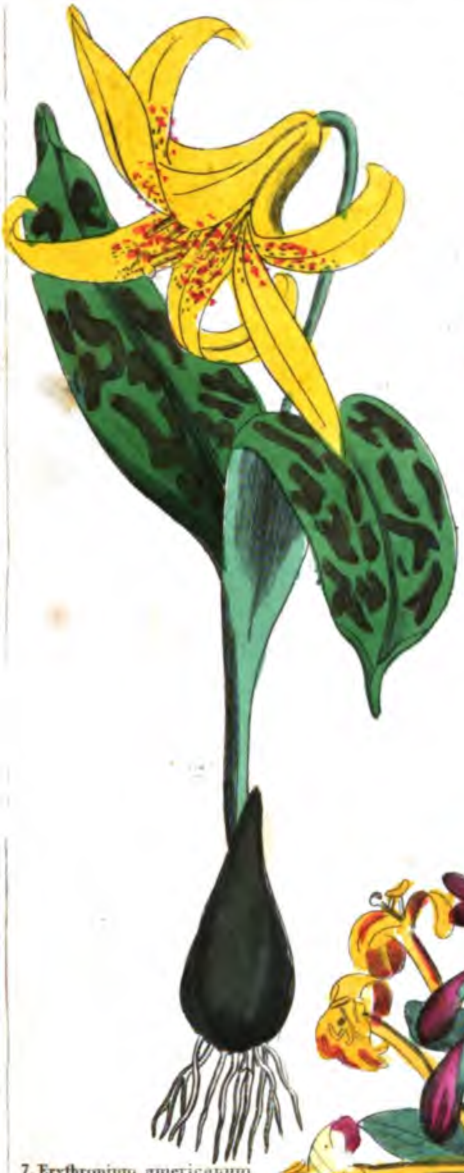
4. Linum Austriacum.



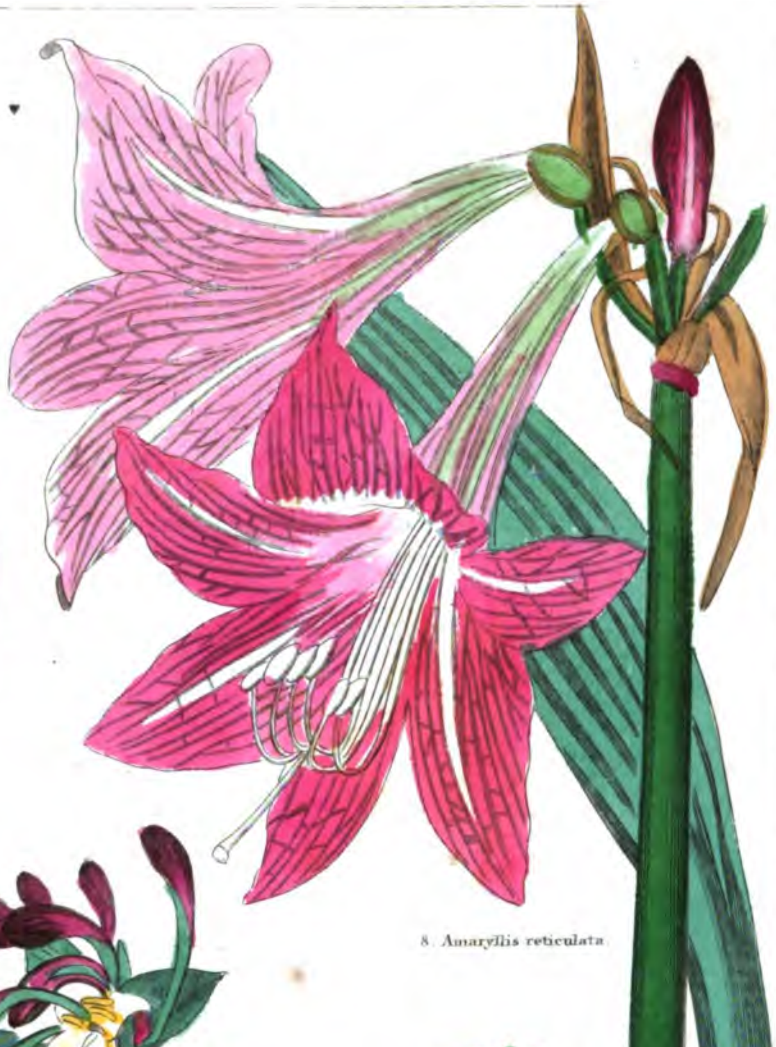
5. Oxalis rubella.



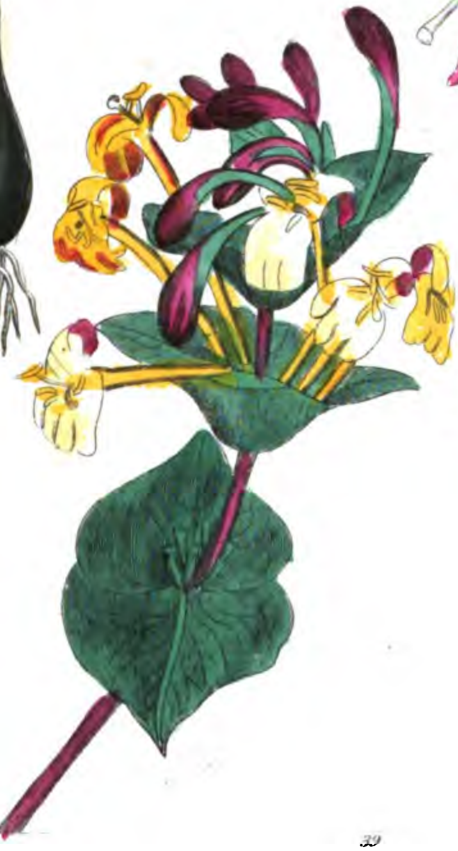
6. Scutellaria Grandiflora.



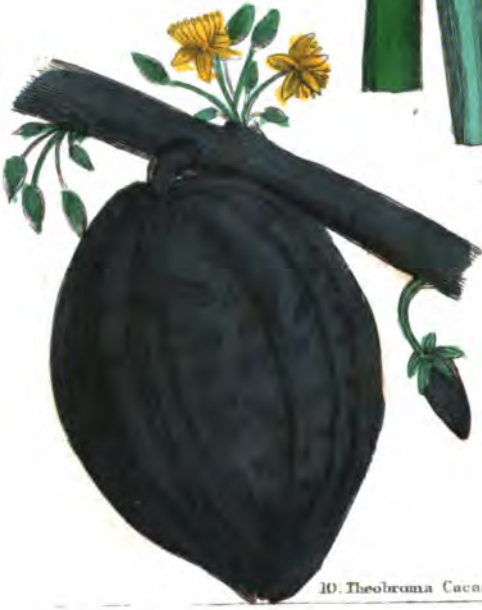
7. Erythronium americanum.



8. Amaryllis reticulata.



9. Lonicera Implexa.



10. Theobroma Cacao.

The Landscape Gardener, comprising the History and Principles of Tasteful Horticulture. By J. Dennis, B. C. L. London: Ridgway & Sons. 1835.

We return to this work, from which we extracted pretty copiously last month, to follow the learned author in his History and Principles of Landscape Gardening. After treating of the formation of Foreground, and of the arrangement of Evergreens, under the general direction, recommending the substitution of a studied assortment of tints for indiscriminate admixture, so as to produce a living vegetative picture, he goes on to remark, that the primary principles of harmony appear so perfectly unknown at the present day, " that successful arrangement of colouring in any branch of the arts, is become an almost fortuitous attainment, the entire result of attentive observation, prolonged experience, and close imitation." There seems to be a contradiction in the ideas of this assertion. How can an attainment be fortuitous, which is the entire result of attentive observation, prolonged experience, and close imitation? But not to be hypercritical, his meaning, as it appears to us in this and similar assertions, is farther explained by a motto quoted from Horace, and which he applies to operative artists, in colours, generally charging them with being " sagacious without rule." Nay, he maintains that the theory of colours is now a lost science, having been distinctly comprehended at an early period, and ascribes extraordinary merit in this department to the regular and secular clergy, who existed during what are called the dark ages. We do not enter, however, into the question of the propriety of such opinions, farther than to say, they savour strongly of an antiquary's partiality. We rather extract some ingenious remarks explanatory of a theory which he himself entertains on the subject of colouring.

" To demonstrate the theory of colours, then, a circular card may be divided into seven compartments, by lines drawn from the centre to the circumference, one compartment being painted red, the next orange, the third yellow, the fourth green, the fifth blue, the sixth purple, the seventh violet. Let water-colours or patterns of ribband, of each of these respective colours, be procured and arranged in the enumerated order. It will be found, that any one of these colours is producible, by due admixture of the two adjacent colours. The first and third red paint, mixed with yellow, produce the second colour, orange. The second and fourth, orange mixed with green, produce the third, yellow; the third and fifth, yellow and blue, generate green, the fourth colour; that and the sixth form the fifth, blue; the fifth and seventh violet create the sixth, purple; the sixth and the first, red, constitute the seventh, violet; the seventh and second, orange, terminate in the first, red. What then is the necessary conclusion, but that in the order of prismatic colours, adjacent colours are inharmonious; and that harmony results only from union of two colours, distant in order by one intermediate tint. The principle productive of harmony being thus discovered, may receive confirmation by experiment with ribbands of different colours, blended, or with sewing silks twisted, in the preceding order of arrangement. Yet, beauty resulting not only from harmony, but also from contrast, the next inquiry is, from what principle to produce the latter effect. It is discoverable from the following experiment. To patterns of ribbands or silk, of the seven preceding colours, let white and black be added; and all be placed in a perpendicular line, the white above the red, the black beneath the violet, adapting the numbers to the altered arrangement, the white being denominated one, the red two, and so on, the violet being marked eight, and the black nine. By advancing black to the side of white, or as it is accounted the absorption or absence of all colours to the accumulation or presence of all, the strongest possible contrast is produced. Violet and purple will also contrast with white, in decreasing ratio; while the remaining colours produce a very inferior degree of contrast, by no means eligible from their approximation to white, in graduated reflection of light. On a similar principle, the best contrast to black next to white, is red, as the colours ranking first of the seven in order of refraction, therefore first in power of reflection; orange is an inferior contrast, but yellow, blue, purple, or violet, from graduated absorption of light, present no contrast to its entire absorption, black. In the same manner red receives no contrast from the two nearest colours in the prismatic gradation, orange or yellow, but from the semi-colour green; it admits the lowest contrast in blue, higher in purple, or violet, and the highest, as already remarked, in black. The decisive inference then is, that contrast is not producible without passing over two prismatic colours at least.

" Such being fixed laws, constituting the primary principles of the theory of colours, and demonstrable by experiment multifarious and conclusive, their application to landscape gardening involves not the slightest difficulty, and solves numerous phenomena. Why, for instance, does verdure, or why do shrubs, supply the best relief to gaudy flowers? On account of excellent contrast, green being a sober colour intermediate between the deeper and brighter tints, consequently affording a foil to all. Why is snow injurious to the effect of foliage, or flowers, of every graduated tint? On account of its glaring whiteness, supplying neither contrast nor harmony, white entering into the composition of every shade of tint, and particularly being productive of semi-colours; consequently, being a component principle, when uncombined it can neither harmonise, nor contrast with itself. Why does the olive tint of the expanding oak-leaf offend the eye of taste? Because, its being composed of green in combination with yellow, the component principle can neither harmonise nor contrast with itself, in a simple uncompounded tint, in the surrounding grass, or foliage of more forward trees. Why does the verdant herbage of spring produce inferior pictoresque effect, in grounds ornamented with trees, than the sterile grass of early autumn, consequent on mowing? Because, spring grass and foliage are gradations of one and the same colours; consequently, in whatever variety of gradation, the diversified tints of any colour, neither harmonising nor contrasting, cannot possibly be productive of pictoresque effects. Contrariant is the effect of sterile grass, on account of its russet tint, like ripened corn, presenting advantageous contrast; russet being a semi-colour, uncompounded of green. Countless natural phenomena, with their solutions, might be multiplied, illustrative of the preceding theory of colours being of practical utility in landscape gardening."

This theory the author elegantly applies to various kinds of deciduous trees.

" If a common ash, from its beauty, have received the dignified appellation of ' the queen of trees,' well may the elegant form, delicate foliage, and vivid tint of the acacia, merit for it the paramount dignity of sylvan empress. Illuminated by the declining sun, its leaf is delightfully pellucid, and presents admirable relief to the resplendent glow of a western evening sky; its thinly clothed branches, like those of the ash, being peculiarly adapted to transmission of this glorious object, elevating the reflecting mind to celestial contemplation, and associating the grand idea of that light inaccessible, the transcendent pavilion of its divine Author. An enthusiastic admirer of rural scenery is frequently impelled to ' moralize the spectacle,' and spontaneously to vent his devout emotions, by repetition of Milton's appropriate apostrophe, ' These are thy glorious works, parent of good! '

" Both the acacia and ash are too elegant for groups, therefore require prominent situations, and infrequent recurrence; familiarity with beauty diminishing admiration, and contrast augmenting respect. These remarks should be extended to another most beautiful tree, the plane; a select decoration, sparingly introducible into fore-ground. Superior beauty should in general be arranged for distinct perception, by unique and advanced position. The ash, however, is unfit for fore-ground, being of a nature peculiarly exhausting to soil, and is inexpedient, having excellent succedaneum in either an acacia or plane. The tulip-tree, horse-chesnut, Spanish chesnut, birch, and lime, spreading their branches to great extent, are advantageous in supplying a mass of deciduous foliage; yet being, what is termed, cabbage-poled, should be contrasted by groups of tall poplars, and are adapted rather to a retiring grove, than to a detached or prominent position. Such position should be reserved for that king of the forest, the massive sturdy oak, or its sufficient substitute, the handsome walnut. These, from contorted branches, spreading width, and divided masses of foliage, furnish excellent contrast to the more elevated elm, a tree of elegant form, when not shorn of lateral branches."

Christmas and its symbols give an interest to the following suggestions and information.

"In situations unfavourable to plantations, any indigenous tree is too valuable to be improvidently destroyed, however defective in form, or uninteresting in appearance. Even a stiff pollard oak, elm, or ash, should be carefully preserved; and, previously to recovery of a tolerable head, may anticipate mantling, by contributory aid of parasitic shrubs, as ivy or misletoe. The former, readily adhering to dead wood, may supply perennial ornament even to a scathed tree, struck by lightning, on an elevated spot. The latter attaches itself to trees of a smoother bark, in Druidical times having acquired a sacred character, by adherence to the oak. At present, it more frequently is appendant to the apple-tree; and merits cultivation in pleasure ground, not merely from perennial supply of decoration, but for the ulterior purpose of furnishing attractive food to the melodious nightingale, ants' eggs alone being unsatisfactory. Through absence of misletoe this bird of passage never migrates from Somersetshire, to the adjacent county of Devonshire; a single instance of misletoe being recollected to have existed in an apple orchard in the vicinity of Exeter."

Our author addresses himself not merely to the rules that should regulate the selection of tints so as to please the eye, that being the leading object in tasteful horticulture, and to the means by which to provide attraction for melodious winged visitors, but to the manner in which gratification may be supplied to a third sense, by the production of odour. Hence the student of landscape gardening is seen to have a wide and various field for his taste to deal with.

"'A garden is incomplete, until converted into a wilderness of sweets. Even that humble weed, designated as the Italian's darling, the mignionet, rarely admitted into the cottager's garden, through want of glaring attraction, and therefore by its fragrance generally intimating the vicinage of genteel abode, should be suffered to spread with luxuriant wildness; and fortunately has such tendency if uncontrolled, and merely allowed to ripen and shed its seed. Its continual blowth from May to October, its requisition of little space, content to creep at the feet and in the interstices of shrubs; its delicate shade of russet tint; its tenacity of possession when once acquired; its contempt of the gardener's industrious labour; but above every quality, its delicious odour—imperatively claim admission of this sweet weed into every flower-garden. The sweet scented pea, more lordly in size and figure, that of the deep tint being denominated painted lord, and the pink-coloured painted lady, is more attractive in appearance; yet like the climatis overpowering in odour, appears beautiful in masses supported by concealed hoops, but inserted too near a window, becomes oppressive to the inmate. If sown in a spot favoured with sun, and sheltered from wind, like the ten-week double stock or July flower, it contributes with powerful effect, when sufficiently abundant, to the grateful odour of a flower garden;—an odour equalled by no artificial scent from the perfumer's store, when compounded of the various products of autumnal growth. During the occupancy of Powderham Castle, its plantation garden was deliciously odoriferous, toward the close of August and commencement of September; aromatic plants and shrubs of diversified species, uniting in supply of contributory scents.

"The white violet, primrose, lilac, syringa, lime-tree, apple-tree, with numerous vernal trees and plants, the rose, carnation, jessamine, geranium, hawthorn, with countless exotics in summer, several in addition to those already named in autumn, and the myrtle in every season, the winter not excepted, and even the decaying cast-off leaves of the poplar during the first of three stages of fermentation, the vinous process, all contribute conjointly or successively to recall to the contemplative mind, one of the innocent gratifications of sensual pleasure not incompatible with the spiritual purity of paradise."

The author exerts himself laudably in correcting the erroneous apprehensions respecting the field for practical horticulture, so prevalent, viz. that it must be on an extensive scale. He argues that it may with perfect facility be developed, and be productive of happy effect in the public squares of a city, and in front of rows of houses. And that distinct comprehension of his suggestions may be facilitated by instances of appropriate character, he refers to well-known cases, from which we select, for our town-readers, these striking remarks.

"The space of merely a few square yards, might be converted into a tasteful picture, by judicious arrangement, but for the house-builder's usual obstruction to taste, by constructing an entrance in a wrong place, the centre of the boundary fence. Placed but a few feet from the angle, it admits concealment by shrubs; and allows unbroken grassy slope to be formed, surmounted by ever-greens against the road, and extending about two-thirds of the side opposite the walk, such walk not exceeding in width three feet and a half, and drawn with very slight degree of incurvation, just deviating from a straight line acuter at commencement, and obtuser on approaching termination. From want of space for shrubs, the side fence adjacent to the walk should be clothed with Irish ivy, that opposite admitting a screen of perennial shrubs of the class already recommended. Three handsome ever-green shrubs, as arbutus, lauristinus, and phylirea, are frequently a sufficient number for detached position, the phylirea being placed near the entrance, the lauristinus near the obtuse incurvation of the walk, and the arbutus on the opposite side of the area, at nearly two-thirds distance from the house. In front of the shrubs, that delicate contrast to their deep hue, annual stock, should abound, preceded by the vernal flowers. Passing from the front along the side, the slope should be incurvated, and gradually continue diminishing in height, without abrupt termination. The grass should extend from the upper part of the slope nearly to the house, leaving only a few inches of parterre, for roses, mignionet, and other sweet-smelling annuals. An area thus disposed, could not fail to please, by its simple and natural character.

"The finest illustration of the possibility of producing beautiful effect on a small scale, is a plantation of ever-greens, on this side of the Colosseum, in the Regent's park. It forms the richest, grandest, most sumptuous and judicious arrangement of perennial trees and shrubs, ever produced within such trivial space. Constituting a most beautiful screen to the Swiss cottage, it may justly be esteemed an incomparable model for general imitation, in areas similarly circumstanced; and should be minutely copied, through all its transcendent features, in the flanking plantations of every splendid mansion. It does more than supply exemplification of the directions, given for such important purpose, in an earlier part of this essay. In the British metropolis, such superior specimen of tasteful selection, and scientific disposal of perennial trees and shrubs, was peculiarly required, in a spot sufficiently detached from the influence of its smoky atmosphere, so deleterious to vegetation as to render ever-greens in the area of every square deciduous."

More than enough has now been cited from this treatise to show how beautifully diversified are the capabilities which the Landscape Gardener has to deal with, and how well calculated the author's mode of discussion and speculation is to yield information, and excite every ingenuous mind to inquiry and self-improvement.

COUNTY OF CARLOW.

This is an inland county of the province of Leinster, in Ireland. It is bounded on the north by Kildare, on the north-west by Queen's County, on the north-east by Wicklow, on the south-east by Wexford, and on the west and south-west by Kilkenny. Its greatest length from north to south is thirty-three miles, and though in one part from east to west it measures twenty-three miles, its average extent in that direction is considerably less. Its surface is estimated at 222,915 acres, or about 348 square miles.

The general aspect of the county is pleasing, being throughout diversified with hills and valleys, the latter bearing good herbage, and enriched with trees; the former generally bearing vegetation to the summits, except in the southern extremity, where the lofty range of Mount Leinster, and the Blackstairs Mountain, of precipitous ascent and sombre hue, form between this county, and that of Wexford, a barrier that is impassable as to all commercial intercourse, were it not that there are three passes through it, one formed by the river Slaney, another a land passage, and the third by the river Barrow. The level part of the county is rich and fertile, the soil being of a calcareous nature, and in many places cultivation has extended considerably up the sides of the mountains. The chain of mountains which have been mentioned, is wholly of granite formation. The western extremity of the county, which lies beyond the Barrow, though differing materially from the other parts, has the deficiencies in agricultural produce and scenic beauty compensated by the treasures of the subsoil; for here the great coal district of Leinster commences, extending eastward and southward into Kilkenny, and supplying an abundance of cheap fuel. The county is intersected from north to south, by the Barrow in the west, which is navigable throughout the whole extent of it, and the Slaney on the east, which passes out of Carlow into Wexford, at the town of Newtownbarry. The Barrow affords means of navigation to the port of Waterford.

Carlow is reckoned one of the first dairy counties in Ireland. Great attention is paid to the feeding of cattle. The farms are frequently large. From twenty to fifty cows may belong to one dairy. The dairies are very often let out at an annual rent, rated according to the number of cows. Carlow butter has long been in high estimation. The farms are occasionally stocked with flocks of long-wooled sheep, which are reared for their mutton as well as for their fleeces. Yet, although agriculture be the chief occupation of the inhabitants, tillage is still in a backward state. The natural capabilities of the soil are able to return to the judicious cultivator, much more than has ever yet been drawn from it. The lowland part of the county is embellished with numerous seats of the gentry; and their plantations as well as mansions are in many cases highly ornamental.

Carlow was made shire ground by King John, under the name of Catherlogh, since contracted into its present form. It was then one of the nine counties palatine, which enjoyed exclusive jurisdictions in Ireland. It is now divided into six baronies, and again subdivided into thirty-six entire parishes, and seven parts of parishes. According to the new act, it sends two members to the imperial parliament. The Roman Catholic is the prevailing religion. The manners and appearance of the peasantry differ little from those of the other southern agricultural districts. They dwell chiefly in detached cottages, or in small villages, as there are but three towns, Carlow, Tullow, and Leighlin Bridge, the population of which exceeds 2000 souls, and few villages of considerable size. The population in 1813 was 69,566 souls; in 1821, it was 78,952, and in 1831, it was 81,576.

CAERMARTHENSHIRE.

This is one of the counties in South Wales, containing 926 square miles, or about 590,640 acres. It is bounded on the south by St. George's Channel, on the west by Pembrokeshire, on the north by Cardiganshire, and on the east by Brecknockshire and Glamorganshire. The general appearance of the county is hilly, and towards the north and east, these hills rise into mountains. It is almost every where intersected with narrow vallies, from the skirts of which the hills rise abruptly. The most celebrated for fertility and beauty is the vale of Towy, which stretches thirty miles up the county, with a breadth of only two miles. There are some fine rivers in Caermarthenshire, and some good ports. The principal exports are tin plates and cast iron.

The climate of this county, though moist, is much celebrated. The air is reckoned milder and more salubrious than that of most of the adjacent districts. The soil is also less rocky and mountainous, and more fruitful in grass and corn. Wheat however does not thrive well. Barley succeeds better, and very considerable quantities of oats are annually exported to Bristol and other places. Horses and black cattle are reared in great abundance on the hills, and these form the chief articles of trade in the different fairs. The pasture being good, supports a heavy stock. Much butter is exported. It is computed that 114,000 acres are in tillage, and about double that number in pasture; the rest is unfit for cultivation, though by no means unprofitable. Caermarthenshire was formerly extremely well wooded; but of late years great waste has been made of the timber. Its rivers abound with fish, especially salmon, of excellent quality, and a species of trout, in high request with epicures.

This county is rich in mineral productions. Coals and lead are the most profitable and abundant. Limestone also abounds, and there are considerable quantities of iron ore. At Kastell-Karreg there is a fountain which ebbs and flows twice in twenty-four hours.

This county is divided into eight hundreds. It has five market towns, and contains very many parishes. The inhabitants who are not engaged in agriculture, are principally employed in working the mines, in manufacturing the produce of these mines, and in making woollen stockings. The money raised for the maintenance of the poor in 1803 was 17,046*l*., at the rate of 12*s*. 9*d*. in the pound. In the year ending the 25th of March 1815, there was paid in parochial rates, the sum of 30,354*l*. from eighty-three parishes alone, the remainder not having made any return. The population returns were 77,217 in 1811; in 1821 the amount had risen to 90,239; and in 1831, it was no less than 100,800.

ON PRUNING OF TREES.

Mr. Stephen Ballard, in an ingenious Treatise on the Nature and the Pruning of Timber Trees, maintains a theory greatly at variance with the systems advocated by many. His doctrine on pruning does not go to point out when or how this operation should be performed, but to condemn pruning altogether, as being not merely of no service, but positively injurious. It is a subject, certainly, that admits of nice disquisition, and we are sure that our readers will be struck with the manner in which this gentleman handles it.

His little work is divided into a number of chapters, treating of a variety of points connected with timber trees. The first is on the nature of trees—their power to evade the force of the wind—balancing boughs—property of assuming the best shape, &c. The second chapter is on the natural shedding of sprays, which runs thus:—"Trees have the power of pruning themselves; all useless branches die, and drop off. In many kinds of trees, the quantity of branches thus disposed of during the time a tree is coming to maturity, is much greater than the quantity retained, when at maturity. This may to some persons seem unlikely; but let it be considered that the circumference of the head of a tree preceeds almost from a point, and that the extremities of the branches have been, at some part of the tree's life, in every part of the space within the limits of the space occupied by the head of the tree when at maturity. And let it be remembered how close the twigs or small sprays are situated to each other round the head of a tree; and observe how close the whole inside space within the extremities of the branches would be filled, had all these small sprays remained on. If this be well considered, some idea may be formed of the immense number of sprays pruned off in this natural way, by means of discontinuing sprays in such situations as are no longer suitable, and of the advantage the tree has of forming itself in the best possible shape for its situation.

"Let the pruner, before he commences his attack upon a tree, observe that its branches are selected or chosen from a number many times as great as the quantity left, and that they are the selected few, found by experience to be well situated. If he pause and consider this but a little while, he will be humbled, the insufficiency of his judgment will appear, and he will estimate his abilities more according to their value.

"I fear that my attempts to show the existence of this natural pruning, may not to many appear sufficiently clear; and therefore I will endeavour to explain more fully; for certainly if it be shewn that trees themselves observe and practise a system of pruning off useless branches, it must be a strong argument against any interference on the part of man, and especially if man be ignorant of the tree's power of performing the work itself.

"I find it difficult to express my ideas sufficiently plain for the general reader, at the same time am anxious to make known to all, what I have observed in the nature of trees; and if my endeavours fall short of what I wish, still I have hopes that my observations may call the attention of some to the study of the subject. If those concerned in the growth of timber, would but apply themselves to the investigation of the nature of trees, disregarding any old-fashioned dogmas relative to their management, that may have been handed down to them, they would gain much more extensive information than it is possible to gain from a book. I therefore earnestly entreat the cultivators of timber to apply themselves to the subject, which is now so little understood.

"There seems to be a singular want of knowledge, patiently endured, respecting the nature of trees. The investigations of physiologists are unfortunately confined too much to the internal organization of the sap vessels, and the motion of the sap, and not extended, so much as they should, to the rules and circumstances that rugulate the external form and development of trees. As a proof of the great want of knowledge of the nature of trees, I need only instance how little the necessity of selection of trees to be transplanted is, even at the present day, known, and that it was almost wholly unknown before the publication of Sir H. Stewart's valuable book, the Planter's Guide. But to return to the subject of natural pruning:—A person who has not contemplated the subject, will hardly believe that the number of sprays retained by a full-grown tree, bear but a small proportion to the quantity that the tree has itself pruned. Now, to show that this must be the case, let us trace the growth of a tree—suppose an oak, from the seed to maturity. The first year's growth of a tree from the seed is generally one perpendicular shoot; the second year, side branches are most likely formed within a few inches of the ground; this to be sure depends upon the situation of the plant; but a young tree does not proceed, at any rate, far, without side branches. These side branches are, each successive year, extended and multiplied; so that by the time the tree has attained the height of eight or ten feet, it has many tiers of branches, extended and divided into numerous small sprays. The growth continues; the head each year extends—the stem thickens—and, let us suppose the tree has reached the height of forty feet. We now find it covered with innumerable sprays, closely filling up the spaces round the circumference of the head. The size of the tree continues to increase; the proportion and symmetry of its make are maintained at all times; and we see, when it has arrived at the height of eighty feet, with a stem probably five feet in diameter, its stem and branches bear the same proportion to each other, that they did when the height was forty feet. Compare it now with what it was when but forty feet in height; at that height it had sprays to the number very likely of one thousand; look to the full-grown tree, and imagine a space within its boughs equal to the size of the tree at forty feet height. Observe how many boughs the full-grown tree has in this space, and you will immediately see what an immense number of sprays must have been shed. The large limbs extend, perhaps several feet from the stem, without any subdivision. There are now no limbs branching out from the stem, within ten feet of the ground; but when the tree was but eight feet high, it had many tiers of branches, extended and divided into many small sprays; and when the tree was still younger, the side branches spread out from the stem within a few inches of the ground. What is become of them? Now, there is not a side branch within ten feet of the ground. The space formerly filled by the stem, branches, and the whole of the young tree at eight years of age, is now occupied by the huge, solid, and beautiful stem of an oak; not a sign of the side branches, so numerous in the young tree, can be seen, they are all vanished, only the leading shoot remains, and that enlarged to such a size that it bears not the slightest resemblance to what it was in its youth.

"Some imagine that whenever a stem is free from branches, it is owing to pruning or to the browsing of cattle; but this is not the case: it is natural to a timber tree, be its situation what it may, to have a certain portion of its stem clear of branches.

"There are no pruners in the uncultivated forests from whence we have the long pines and deals imported, with often thirty or forty feet of clear stem before the branches begin. These trees have grown without the assistance of the pruner, and they have shed boughs that were far above the reach of cattle. These forests clearly prove that trees have the power of shedding such sprays as are useless or unnecessary; for a tree could not reach the height of thirty or forty feet without a great number of branches. It must have branches when but a foot or two high; the number and size of these branches must increase as the tree increases in height, and a tree thirty feet in height must have a great number of branches; yet we have the stems of trees thirty feet high without a single branch. How do the advocates for pruning reconcile this to their philosophy? Will they assert that the stem is stretched or protruded, so that the boughs first situated near the ground are, by the growth and lengthening of the stem, lifted up farther from the earth? This they cannot say; yet they will have great reluctance in admitting the existence of this natural shedding of sprays, for no person who well understands it, will ever prune under the idea of improving the shape or increasing the quantity of timber.

"It has been stated that it is natural to all trees to have a certain portion of stem free from all branches. The length of the stem clear from the branches depends on the situation of the tree. In proportion as the situation is exposed the stem is shorter; but if it were possible to have a tree grow to maturity, without ever having its lower boughs either cut off, or destroyed by other trees or bushes, that is, if the ground round about the tree were entirely without any other vegetable whatever, and the situation were open and at the same time the tree protected from any thing that could injure its lower boughs, a tree so situated would, when at maturity, have a portion of its stem free from boughs.

"The manner in which the boughs are shed, is much more perfect in some trees than in others. The oak effects it in the most complete manner. Every one who has at all turned his attention to the growth of an oak, must have observed a number of dead sprays lying under the trees; but the authors of all the works I have read, relating to the management of trees, have omitted to notice these naturally shed sprays.

"If the end of one of these sprays be examined, it will be found to resemble the end of the footstalk of a leaf, where it has naturally separated from the spray; it also has an appearance something like the end of a buck's horn, where it has separated from the head of the buck. The shape and appearance of the part that has separated from the tree will convince any one that it is a natural division. The end of the spray is a little convex, and entirely without that jaggedness attending the fracture of living sprays. Now it is after this natural pruning only, that a union takes place between the old and new wood; although many pruners buoy up and encourage themselves with the idea, that the old and new wood unite, where their clumsy operations have been performed; for clumsy indeed are the operations of the pruner in comparison with those of nature. I may be accused of a want of courtesy; but there is little due to those who have the assurance to take upon themselves the correction and improvement of a thing, the nature of which they are so ignorant of, as to be unacquainted with the power of trees to discontinue such sprays as are in situations no longer provided with the necessaries for the use of sprays.

"If I have succeeded in the attempt to shew the necessity of sprays being shed, let not any pruner, blinded with his own sufficiency, imagine this circumstance in favour of pruning. Perhaps it may be said, that it is shewn that pruning is a natural operation in the growth of trees, and man, when he performs the work, is assisting nature. But nature does not want this kind of assistance. The only way in which nature can be assisted in the growth of trees, if assistance it must be called, is by improving the situation, and increasing or bettering the food of the tree. As for instance, the growth of a tree may be encouraged by the removal of surrounding trees, by improving the soil in which it grows, or by protection from any injury it may be liable to. The knife cannot be used on the live part of a tree without inflicting an injury and lessening the growth. The sprays that drop off of themselves are not shed because they were robbers, but because their situation had become, by the growth of surrounding sprays, unfit, by being made too limited or too dark. Nor do the pruners know which sprays have sufficient room when they cut away so unhesitatingly. If they cut away sprays where there is room for their growth, they in addition to the injury, by the irreparable blemish inflicted in cutting the wood, retard the growth of the tree. And if they cut away sprays that would of themselves drop off, their labour is useless, and most likely injurious, as the sprays would be removed before there was any necessity. It is worthy of remark, that the young shoots, which seldom fail to shew themselves after the pruner's operations, are never to be seen where sprays naturally separate themselves from the tree. All kinds of timber trees practise this natural pruning, but few that I have observed in so perfect a manner as the oak."

We may remark on all this, that there is in it a good deal of truth and ingenuity, and a good deal of assertion without proof, nay, as it seems to us, contrary to facts. Does not every one know that pruning of fruit-trees increases their produce, both in quantity, size, and quality? What would a gooseberry-bush become, if the pruner never gave it air and light by cutting away a number of its centre branches? Will Mr. Ballard say,—ah! these are subject to an unusual degree of cultivation, and therefore taken out of the rank of timber trees? Why, he insists on cultivation, in so far as artificial bettering the soil and situation goes, even in relation to timber trees. Farther, we insist, it is an assertion against facts in every department, to say nature cannot be assisted by human art. What would be the product of the soil in any of its vegetable forms, without human culture, which consists as often in guiding and repressing luxuriance as in fostering or encouraging it? Mr. Ballard also declares that the boughs on the stem of a tree are not removed gradually from the ground by the growth and lengthening of the stem. He might just as well assert, that the arms of a man six feet high, are not the same arms that were attached to his trunk at his birth, when not more than a foot and a half high. The sneer too against books on the subject of trees, will apply to his own, upon his own grounds, unless he prove to us that his predecessors never observed for themselves, nor made use of their reason. There are on every subject, and on trees amongst the rest, treatises that not only instruct the student, but entice him to investigate nature for himself.

LOUDON'S ARBORETUM BRITANNICUM.

Mr. Loudon proceeds in his strength with this work. The thirteenth and fourteenth numbers are now before us, and present the most interesting sections that we have yet seen of this important and elaborate undertaking. Trees certainly form a fine subject for description and discussion; yet no one, who has not perused even the parts of the Arboretum Britannicum which have already been published, will conceive how much can be made of this fertile theme. It is a work which must find acceptance with every rural cultivator in every country, not merely because it treats generally of trees, but because it treats of the trees of every cultivated part of the world, and shows and points out where exotics may be introduced. For instance, in the portions before us, we have the trees and shrubs of Switzerland, Italy, Greece, Spain, Portugal, &c. enumerated and described; a few passages from some of these descriptions will convey not a little information.

"The exotic trees cultivated in Switzerland have been introduced by degrees as ornamental plants; those now most common are, the horsechestnut, the catalpa, the tulip tree, several kinds of limes and maples, and the cedar of Lebanon. Till the beginning of the present century these trees were planted only by proprietors who had some connexions or commercial dealings with other countries, particularly with England. There were scarcely any nurserymen or botanic gardens at Zurich, Bâsle, Geneva, or Berne, but what were reduced to confined spots in the interior of the fortified towns, and which, consequently, could have little influence on the culture of trees in the country.

"This state of things has changed greatly within the last twenty years. The new botanic garden of Geneva, planted in 1818, in a less confined situation than the old one, and confided to the care of M. De Candolle, has presented to the public a numerous collection of trees and shrubs, especially of fruit trees, chiefly from the nursery of the Messrs. Baumann at Bollwyller. The sight of this garden, which is constantly open to the public, excited the zeal of proprietors, and soon made them anxious to form plantations of various kinds of trees. This gave encouragement to the nurserymen, and their establishments became, in consequence, greatly extended, and their number increased. The season of peace and security which has followed a long period of war, has produced nearly the same result throughout all Switzerland. The number of country seats has greatly increased, particularly near the towns, and, more especially, in the cantons of Geneva, Vaud, Bâsle, and Berne; and a number of parks and groves have been planted, which now ornament the country. In the environs of Geneva, for example, the sale of trees and shrubs is four or five times as great now, as it was about twenty years ago.

"The largest nursery in Switzerland at present is supposed to be that of Messrs. Dailledouze, at Sacconex, near Geneva, which may be fairly estimated now to contain nearly 1000 ligneous species, in the botanic sense of the word species; and above 2000 species and varieties, if we count among the number the principal modifications of fruit trees, roses, and azaleas. The other public and private gardens of Switzerland contain few varieties, especially of the hardy kinds, which are not in the nursery of Messrs. Dailledouze. In adding, then, about 200 species to those which are to be found in this nursery, and counting about eighty indigenous ligneous plants, which have not been taken into cultivation, we shall find that the whole ligneous flora of Switzerland amounts to about 1300 species. The result of this approximated calculation shows that, from foreign commerce and improved cultivation, five or six times as many species of trees and shrubs are now grown in Switzerland, as existed there originally.

"In the botanic garden, *Zizyphus vulgàris*, the pomegranate, and the fig, live against walls, and ripen their fruits. The kölreuteria, the cork tree, *Quércus fastigiàta*, *Júglans fraxinifòlia*, and the *Arúndo Dònax*, stand at Geneva, even in the open country. *Quércus* fastigiàta, in particular, which was introduced by M. De Candolle about 1820, promises to become a great ornament to the Swiss parks. The resemblance which this tree bears to the Lombardy poplar, except that it has an oak leaf, gives it a very extraordinary degree of interest.

" If we search in Switzerland for trees remarkable for their antiquity or rarity, we shall find several worthy of being mentioned here. We shall begin with indigenous trees, and then proceed to those which are exotic.

" At Fribourg, in the public square, there is a large lime, the branches of which are supported by pieces of wood. This tree was planted on the day when the victory was proclaimed of the Swiss over the Duke of Burgundy, Charles the Rash, in the year 1476; and it is a monument admirably accordant with the then feebleness of the Swiss republics, and the extreme simplicity of their manners. In 1831 the trunk of this tree measured 13 ft. 9 in. in circumference.

" The tree of Trons, in the Grisons, is a monument of a similar nature: under the shade of this tree, it is said that the deputies of the country swore to free themselves from the yoke of their lords. This tree is celebrated in all the local poems as being a lime, but the fact is, that it is a sycamore (*A*cer Pseùdo-*Pl*àtanus), the trunk of which is now 26 ft. 6 in. in circumference at 1 ft. 6 in. from the ground. We can hardly suppose that it could have been less 100 years old, when it served as a place of rendezvous for the conspirators, in which case it must be now nearly 500 years old. In the Bibliothèque Universelle de Genève, for August, 1831, there is a letter from Colonel Augustus Bontemps, in which it is mentioned, that the probable reason why this sycamore is called a lime in the local poem is, that the German word 'ahorn,' which signifies a sycamore, is very unpoetical, while that for a lime tree, 'linde,' is soft and liquid; and this made the former be rejected by the writers of the old ballads.

" The number of trees and shrubs in the British arboretum, received from North America, is considered to be 528, and they comprise the greater part of the names in the foregoing enumeration. Still, as it is not always certain that the same names in our catalogue are applied to the same things, there may be a number of species described by Pursh which are not yet introduced into Britain. At all events, we have little doubt that, in the unexplored parts of North America, there are many species that will, at no distant day, find way to Europe.

" The greater part of the trees and shrubs of Europe, which are remarkable either for beauty or utility, appear in the catalogues of the American nurserymen, more particularly in those of Prince of New York, and of Carr, the successor of Bartram, near Philadelphia, From a MS. which has been kindly sent to us by Dr. Mease, containing the dates of the introduction of a number of European trees into America, we find that some took place as early as the settlers there from this country; and that the introduction of European trees was in an especial degree accelerated by the establishment of tree nurseries. William Hamilton, Esq., of the Woodlands, near Philadelphia, is stated by all the collectors of plants in America, during the last century, to have had the most complete garden in the United States. It is said to have contained not only all the plants of America, but those of Europe and other parts of the world, which were considered of interest either for arts or medicine. In Bartram's Botanic Garden there appears to have been the best collection in any nursery; and probably, at present, it is only equalled by that of Prince of New York. No nursery in America is superior to Bartram's for fine specimens of trees.

" Part of the United States, and the Canadas, were visited by two excellent arboricultural observers; Mr. Robert Brown, formerly a nurseryman at Perth, and Mr. James Macnab, the son of the curator of the Edinburgh Botanic Garden, in the autumn of the year 1834; and an interesting notice of the distribution of different species of trees in the countries they passed through has been published in the Quarterly Journal of Agriculture, vol. v. p. 594., and will be found also in the twelfth volume of the Gardener's Magazine. Before landing at New York, the country appears to the stranger of a very dark and dismal hue, from the quantity of pines and red cedars which clothe the more conspicuous prominences; but, after landing, the whole, from the prevalence of fine trees and shrubs, appears like one vast garden. The stranger is strongly impressed with the beauty and number of trees, which are partly indigenous to the locality or the district, and partly introduced from more southern climates. The diversity of the forms of the trees, and the variety of their foliage, are most remarkable. No remains of ancient forests are observable, as might be supposed, these having been long since cut down for fuel; but forest trees of large size are frequently to be seen, covered to their summits with wild vines. Of these the *Pl*átanus occidentàlis, liriodendron, liquidambar, Gledítschi*a* triacánthos, and the catalpa are pre-eminent. It is worthy of remark, that almost the only foreign trees conspicuous in the artificial scenery of America are, various kinds of fruit trees, the Lombardy poplar, and the weeping willow. The contrast between the regular position and round tufted heads of the fruit trees and the lance-shaped heads of the poplars, and between both these trees and the wild luxuriance of the indigenous species, is very striking. About 67 miles up the country, on the river Hudson, a limestone district occurs, and on this the lively green of the arbor vitæ succeeds to the dark hue of the red cedar. All the uncultivated parts of the surface are covered with this tree, of different sizes, varying from 1 ft. to 20 ft. in height, and always of a pyramidal shape. The woods on both sides of Lake Champlain are very various. The principal trees are, the wild cherry (*C*érasus virginiàna), elms, walnuts, sugar maples, and the aspen poplar. The rocky grounds abound with arbor vitæ, and the 'appearance of the lofty white, or Weymouth pine, towering above the deciduous trees, on rising grounds at the base of the hills, of a dark aspect and nearly destitute of branches, was remarkable.' The northern extremity of Lake Champlain exhibits the same trees, with the addition of the balm of Gilead fir. The only tree worth notice on the St. Lawrence river was the canoe birch (*B*étula papyràcea). At Montreal our travellers were much 'surprised to see the great difference which the Canadian winter produces upon those species of ornamental trees which grace the lawns and cities of the United States. As examples, may be mentioned the *Ailántus* glandulòsa, the trees of which were quite small and stunted; Maclùr*a* aurantìaca seemed barely alive; and the mulberries were small and unhealthy. The weeping willows here are almost always killed in winter, although in the neighbourhood of New York the stem of this tree is seen averaging from 8 ft. to 15 ft., and sometimes 20 ft. in girt. None of the catalpas and magnolias, which prove so ornamental in the pleasure-grounds both of New York and Philadelphia, can be made to live here, with the exception of the M. glaúca, and it is in a very unhealthy condition. Taxòdium distichum is also much dwarfed, and barely alive. Peaches in this part of the country do not succeed as standards; but several peach trees placed against garden walls possessed well ripened wood, and had every appearance of affording plentiful crops. The principal ornamental tree cultivated in this part of the country, on account of its beauty, is the Robín*ia* glutinòsa, which, during the months of June, July, and August, bears a profusion of delicate pink flowers, and does not attain a large size.' "

There is a chapter on the Literature of the Trees and Shrubs of temperate climates, which contains a list of the most valuable works that have been exclusively written on trees and shrubs. We pass over this enumeration and the character given of these books, that we may have room for some concluding remarks that follow the history and geography of trees.

" Two considerations may be drawn from the preceding history: the first, respecting the introduction of foreign trees and shrubs; and the second, respecting arboricultural literature.

" On comparing the lists which we have given of ligneous plants, found in the different countries situated in temperate climates, which are not indigenous to Britain, with the catalogue of plants considered as already introduced into this country, it will be found that there are some names of species and varieties, in the lists of almost every country, that are not in British catalogues, and, consequently, not yet introduced. There are a number of names, for example, that are not in our Hortus Britannicus. Here, then, is an important use in giving these lists, because they point out to commercial gardeners, and to amateurs and travellers who are botanists, what trees and shrubs it is desirable to enquire after in other countries: and what they should endeavour, if possible, to introduce into their own. It may also be observed, that the same names that are in the lists in preceding chapters frequently occur in British catalogues; yet it is by no means certain that in every case they are applied to the same plants. Here, then, is another point calling for the exertions of the patriotic botanist or traveller; and it may be observed respecting this point, that it will always be the safest side to err on, to reintroduce plants which are already in the country, rather than to remain in any doubt respecting our possessing them. All trees and shrubs liable to great variations, and of great utility or ornament, such as the genera *Quércus*, *Pinus*, *Pyrus*, *Cratægus*, &c., ought to be introduced in all their varieties. We are persuaded that there are, in France and Spain, many interesting varieties of *Pinus*, and of *Quércus Cérris* and *Q. Ilex*, which have not yet found their way into British gardens. The *Quércus austràlis*, recently introduced in consequence of the information given by Captain Cook may be cited as a proof of this; and there are, doubtless, hundreds of species and varieties of trees and shrubs in North America, that have never yet been seen in Europe. There is, therefore, ample room for exertion, to those who wish to increase the botanical riches of their country; and more especially in the case of that kind of botanical riches which adds so conspicuously and permanently to its ornament, and to its useful resources. It would, however, be a very contracted view of this subject, to limit our views to the aggrandisement of the collections of trees and shrubs in Britain. The time for believing that the exclusive possession of any benefit contributes to the prosperity or happiness of nations is gone by; and the principles of free and universal exchange and intercourse are found to constitute the surest foundation for the happiness of nations. This is so obviously true in matters of botany and gardening, that it cannot for a moment be doubted.

"If it is desirable for us that we should assemble in our country the trees and shrubs of every other similar climate, it must be equally desirable that the inhabitants of every other similar climate should possess all those species for which their climate is adapted; in short, it is desirable for the advancement of civilisation and human refinement, that all the trees and shrubs of temperate climates should be distributed throughout all those climates. This will, no doubt, be the case at some future period, when the civilisation of the whole world is comparatively equalised; and, in the mean time, it may be useful to offer such hints as will contribute towards so desirable a result.

"One of the first steps towards the equalisation of the plants of different regions, of similar capacities for growing such plants, is, to determine, with something like precision, what the plants of each region are. This can only be done by assembling living specimens of all of them, or of such a class of them as it may be desirable to equalise, in one garden, and cultivating them there for some time, so as to determine the species and varieties. In old countries of limited extent, such as Britain, which have been examined by botanists for two or three centuries, the establishment of botanic gardens for determining the number of indigenous species of plants may be considered unnecessary; but this is far from being the case with such countries as North America, Upper India, China, Japan, Van Dieman's Land, and a number of others. It would, doubtless, contribute to the spread, all over the world, of the trees and shrubs of North America, if one part of them could be seen in a grand national garden at New York, and another in a garden or arboretum at Charlestown; or if the whole could be assembled in one grand park and pleasure-ground at Washington. We do not, however, expect this to be done; for, in the progress of civilisation and refinement in every country, there are many much more important points to be attended to than the culture of trees and shrubs.

"With a view both to introduction into any particular country, and equalisation in all similar countries, the first thing that ought to be done, after the indigenous plants of the country are clearly determined, is to assemble, in one garden in the given country, all those of all other similar countries, with a view to determining what they are. Thus, in the case of trees and shrubs, all those mentioned in the preceding lists as being foreign, with reference to the trees and shrubs of Britain, ought to be assembled and proved in one grand British national garden; and the same thing ought to be done in a similar garden in every other country. The idea may be thought chimerical; but it is hard to say what will not be done by nations, when they come to cultivate with ardour the arts of peace and of refinement. The co-operation of individuals attached to the same pursuit may, in the mean time, contribute much to the advancement of that pursuit; and hence, though in the neighbourhood of London it might be difficult or impossible, to induce the metropolis or the government to form an arboretum of 150 acres in extent, so as so exhibit in it all the species of trees and shrubs of temperate climates, that will grow with us in the open air; yet if the proprietors of a certain number of estates within ten miles of London were to agree each to form a collection of the species or varieties of a particular genus, and to allow these to be examined by botanists, the same result would be obtained, at least as to accuracy of nomenclature, as if the whole of the genera and species were assembled in one national garden. We have explained this co-operative system, at length, in the Gardener's Magazine, vol. xi, p. 600, and it is needless to say that is as applicable to every other country as to England, and to every other large town as to London. The practice might, therefore, be adopted in the neighbourhood of Edinburgh and Dublin; and in that of Exeter, for the south of England; Bristol and Liverpool, for the west; York, for a central situation; Norwich, Lincoln, and Hull, for the east; and Newcastle and Carlisle, for the north."

Next follow a number of chapters and subordinate sections on the science of the study of trees. Some specimens will show forcibly how gallantly and easily the author can proceed with his subject in all its bearings, which nothing but the completest knowledge and familiarity with it, could enable him to do. In the chapter on the study of trees pictorially, or as component parts of general scenery, their forms are thus spoken of:—

"The first quality in a tree which will strike a general observer, coming to the study with only a few notions relative to form, will be its bulk, or the space that it occupies in the landscape which meets his eye. This bulk, or magnitude, resolves itself into height and width: and the consideration which immediately follows is, the outline that the tree makes against the sky, or against any other object which appears behind it. The next points that will probably attract notice are, the colour of the tree, and the degree of brilliancy of the lights which appear on its masses. Subsequently, the attention may be drawn to the trunk of the tree: for example, to observe whether it appears to be adequate to the support of the head; whether the head appears equally balanced on it; and whether it stands perpendicularly or obliquely, to the surface on which the tree grows. The next point is, to observe whether the head is open and airy, or compact; and the last, whether the general form of the tree is regular or irregular. All these particulars are equally applicable to shrubs as to trees; with the exception of those which apply to the trunk, which is almost always wanting in what are pictorially, as well as botanically, considered as shrubs or bushes.

"The different points, then, to which attention ought to be directed in the study of trees and shrubs as pictorial forms, are the following:—the height and breadth, or general magnitude, of the tree; the form and outline; the colour, light, and shade; the position of the trunk and branches; the mode of growth; the mode of tufting; the leaves, and the spray and buds.

"*The height and breadth of trees and shrubs* vary according to their kind, and to the soil, situation, and climate in which they grow. The trees of greatest height, in the temperate regions of the globe, are those of the pine and fir tribe: and they are those also which have least breadth in proportion to their height; because their branches, technically called frondose, have not the same tendency as those of other trees to increase in thickness with the age of the tree. The most bulky trees, or those which have the greatest width of head in proportion to their height, are some species of poplars, elms, oaks, &c., and the cedar of Lebanon, which, though it is a tree with frondose branches, yet, when it stands singly, has a head generally broader than its height. The highest shrubs, which grow independently of other objects of support, are, among evergreens, the common laurel, and, among deciduous kinds, the common lilac, the dogwoods, and the Guelder rose. Among the smallest trees, considered as pictorial objects, are the thorns and the spindle tree; and among the smallest shrubs are the heath, the furze, and some of the rhododendrons and azaleas.

"*The form and outline of trees and shrubs* vary chiefly according to their kinds and their age, but partly, also, according to the physical circumstances in which they are placed; such as soil, situation, climate, and, perhaps, above all, proximity to other trees and shrubs. The natural form and outline of a tree can only be ascertained when the tree stands alone. The form which it assumes, when closely surrounded by other objects, will generally be found very different from its natural form; and, therefore, cannot be considered as characteristic of the tree or shrub. Even the climate, or the prevailing soil or wind, will materially alter the form. The cedar, when planted in masses like the larch or the Scotch pine, produces, like them, a straight trunk, with the branches dying off from the bottom upwards; planted singly, its branches often become like so many trunks; in a sheltered situation its top will be pointed; and, in one exposed, it will become blunt or flattened, like the well known cedars of the Chelsea Botanic Garden. Nearly the same observations may be made respecting all other trees: even the sturdy oak, in poor soils and cold elevated situations, becomes a bush; in rich soils and low situations it is a lofty tree, with a straight trunk; and in situations exposed to the sea breeze, it has the entire head of the tree leaning to one side, and presents an appearance altogether peculiar.

The expression and character of forest shrubs, or what a certain elegant female writer would call their poetry, suggest many happy ideas and illustrations.

"Every object in nature that forms a whole has some *expression*. If the nature of the object is unknown to the beholder, the expression which he assigns to it is analogous to that of some object with which he is already familiar; and he uses the same terms to describe its appearance as he would apply to such objects. For example, a tall, erect, regularly clothed tree, will be described by the epithets stately, noble, or handsome; another kind of tree, with a light airy foliage and a wavy stem, will be called graceful; and so on.

"*Character* is some circumstance added to expression, which renders it more remarkable; and the circumstance which has this effect will generally be found to be the accidental exaggeration of some quality belonging to the natural expression of the object. For example, in the case of handsome regularly clothed trees, supposing a number of them standing together, character would be added to one of them by the extraordinary prolongation and magnitude of one or more of its branches; or by some of its branches having been taken away, so as to expose a portion of the trunk conspicuously, while the remainder continued clothed. Character would also be added to one tree, among a number of the same kind all previously alike, if a portion of this tree were scathed by lightning; or if some circumstance were to occur which threw the trunk over to one side. In either of the latter cases, what is called character would be conveyed by the object displaying, conspicuously, something which did not naturally belong to its species; while, in the former case, character was given by the exaggeration of some quality which was natural to the species.

"The expression of trees may be said to be of two kinds: that which proceeds from their organic influence on the eye as forms, without reference to their nature, and altogether apart from moral associations; and that in which moral associations are the principal cause of the expression.

"Supposing a person to see a tree or shrub for the first time, and to be totally ignorant of its nature; he could only look upon it in the light of a form; and, in this case, its expression, to him, would depend upon its resemblance to forms which he previously knew, whether geometrical figures, or the figures of other objects. Thus it is, that the first effort which the mind makes to discover beauty in natural forms is, to recognise in them some of the forms of art; and hence, in the infant state of this taste in individuals, the first trees that would be admired would be those the heads of which bore the nearest resemblance to a globe, a cone, or some readily recognisable figure. The next step would be the recognition of some artificial figure, in the trees or shrubs of more regular outlines. To this would succeed the recognition of several figures contained within one general figure; and, lastly, the recognition, among these several figures, of regularity in their arrangement, or of symmetry in their disposition; of variety; of intricacy; and, lastly, of harmony and of character. In this way it will be seen, that a tree or a shrub is capable of exciting many ideas of beauty, considered simply as a form, and altogether apart from considerations of usefulness, of botanical interest, or of moral associations.

"A tree, to be regular, or, in other words, to have the expression of *regularity*, must exhibit the same number of tufts of the same size, and at the same distance from each other, on both sides of the trunk, or centre line. Such a tree, as a whole, we may suppose to be a regular globular figure; and it is a property of regularity, that one portion of any figure which is regular, being separated from the rest, will still be regular. If the globular head of the regular tree, therefore, were cut exactly in two, either vertically or horizontally, the separated portions would each be regular figures, that is, semi-globes.

"In a *symmetrical* tree, on the other hand, there may be the greatest irregularity in the form and number of the parts, provided, only, that the same quantity of these be distributed on each side of the central vertical line, or trunk, of the tree. In the lower part of the tree, the branches or tuftings may protrude chiefly on the right hand, and be large; and, on the upper part of the tree, they may protrude chiefly on the left hand, and be small; or they may be of mixed sizes in both places. Now, it is the characteristic property of a symmetrical figure, that, when it is cut in two, the parts separated, taken singly, are neither regular nor symmetrical; and, consequently, that they will not produce a whole in any way, unless they are reunited as they were before. By imagining such a tree as we have described, separated into two portions by a central vertical line, it will readily occur to the mind, that neither of these portions was either regular, or could in any way form a whole. Whoever wishes to enter on the study of the expression of regularity, symmetry, intricacy, and harmony, in detail, may refer to articles on the subject in the first volume of the *Architectural Magazine*.

"The lowest degree of *organic beauty*, in a tree, we may suppose to be the form of a small-sized tree with a lumpish head, like the *Pyrus A'ria*; constituting one uniform mass, light on one side and shaded on the other. A higher degree of beauty will be, where the general form of the mass is that of a cone, or where it is egg-shaped; because these forms contain an additional element of beauty to that constituting a globe, viz. that of elongation. A still higher degree of beauty will be produced, where all the branches of the tree, in the case either of a globe or cone, are distinctly marked and regularly placed on each side of the trunk, as in the case of a fir; and one still higher, where the branches and tufts project irregularly, but are still so balanced, on each side of the centre, as to form, on the whole, a symmetrical figure. Such a figure, where the tufts are numerous, varies in point of size and disposition; and, where the symmetry is perfect, will exhibit the greatest organic beauty of which trees are susceptible.

"The association of ideas connected with trees has given rise to what is called their *moral and historical expression.* A tree which is young, and growing freely, is said to be in good health, and thriving; and one that is not growing freely, is said to be sickly. A tree with a thick trunk and spreading branches is said to be strong and vigorous; one with a tall and slender trunk, to be light and elegant; one with a bending, or serpentine, wavy-like stem, as we have before observed, to be graceful; a tree with upright growths, to be rigid; and one in which the branches and spray droop, to be mournful, or weeping. In like manner, there are particular associations connected with trees which bear fruit; with those which grow in particular soils or situations, as mountains, marshes, &c.; and with those which are applied to particular purposes, as the oak for ship-building; the pine and fir for house carpentry; the willow for basket-making; the thorn for hedges; and so on. The historical and geographical associations connected with trees are numerous, and of great interest: for example, the platanus reminds us of the respect paid to this tree in Persia; the sweet bay, of its shoots being used by the Romans to crown their warriors; the vine and the olive, of their unknown antiquity, and the highly prized liquors made from their fruits; and the cedar of Lebanon, of the esteem in which its wood was held in the days of Solomon. A knowledge of all the different associations which belong to each particular kind of tree, as it must add greatly to the enjoyment derivable from them, ought always to form a part of their individual history.

"One of the most common and generally understood expressions of trees is, that which is called their *picturesque beauty.* Much has been written, by Gilpin, Uvedale Price, and others, in order to define the meaning of the word picturesque; and the expression of this beauty has been divided into two kinds: that of the beautiful, or smooth picturesque, suitable for cultivated scenery, and also for painting; and that of the rough picturesque, suitable for wild and forest scenery, and eminently so for graphic representation, whether by the pencil or the palette. Among trees, whether in a wild or cultivated state, are found both these expressions; and, as an example of the first, we may give young specimens of the willow and the lime, and young trees generally; and of the second, the oak, the cedar, the thorn, and old trees generally. For a tree to be picturesque, it is not necessary that it should stand singly, or be at all symmetrical in point of form, or the general balance of its head; on the contrary, a mutilated tree, or one the trunk of which, from some accidental cause, has grown to one side, may be as picturesque as a tree which grows erect, and is comparatively perfect in all its parts; provided only that it is not a peculiar tree. The only thing which is essential to picturesque beauty in a tree, is, that it should be capable of readily grouping with another tree, or with any building, object, or animal, so that the combination may form a satisfactory whole. It is evident that this remark applies alike to trees of the rough picturesque, and of the smooth picturesque; since young trees, which belong to the latter kind of beauty, will group together, or with other objects, just as readily as old trees which belong to the former kind of this expression."

These extracts, or any other portion of this valuable and highly interesting publication, convey a much better idea and recommendation of its merits than any account we can construct, and cannot fail to create an anxiety in every one of our readers to possess the whole.

HEARTSEASE, OR SUMMER VIOLETS.

Mr. Thomas Hogg, of Paddington, in his Supplement to the Practical Treatise on the Culture of Florist's Flowers, has the following observations on the culture of heartsease, to which several florists have of late turned their attention. They have succeeded in raising from seed a numerous variety of plain and variegated flowers of great beauty, which, in the first instance, seem the promiscuous offspring of the viola amœna, lutea, tricolor, and blanda, fertilized and crossed with one another.

"This flower has always been a favourite with the ladies; its endearing names of 'Heartsease,' 'Love in Idleness,' 'Cull me, sweet,' 'Three smirking Faces under one Hood,' (the two upper petals coifing or covering the three lower), 'Pansy,' corrupted from Pensée—thought, alluding to 'keep in mind,' or 'forget me not,' have imparted a more than common interest to it; if it had but the fragrance of the viola odorata, which perfumes the air in March, it would indeed be desirable; but beauty and sweetness do not often go together. Some pretend to say, that viola derives its name from its powerful scent 'ex Vi olendi,' which scent is confined to only two or three sorts; others ascribe to it a more poetical origin. These flowers ought to be planted in clumps, or beds, and then the rich mass of bloom, so mixed, and so many-coloured, produces a very pleasing effect. They come into flower the end of May, and continue through summer. The most prevailing colours are plain purple, and violet, of many shades; red, brown, white, yellow, &c., as well as purple and violet, variegated with white, or yellow, 'freaked with jet,' &c. They like a cool moist situation in the garden, particularly in hot summers, and ought therefore to be planted, not on raised beds, but on such as are kept upon a level with the alleys. They produce seed freely, which may be sown early in spring, in cold frames, to bring it forward; and where the young plants can be sheltered from cold wind and hail storms, till the weather gets warm and settled, when they may be planted in the open garden. They are propagated by dividing the roots, or by cuttings, placed under small hand-glasses in June."

POLLEN.

Mr. Lemon, a nurseryman and florist, near Paris, has discovered that the farina or pollen gathered from single flowers, and kept in a glass, will preserve its virtue for weeks. He has therefore been able to fertilize double and semi-double flowers of different species of the tree and herbaceous kinds, that bloom several weeks apart, and which have never been known to produce seed before. Applied with a camel-hair pencil, he is able to choose the most favourable weather for the operation, so as to avoid the risk of impregnating when the rain might destroy its power.

CRITERION OF A FINE PINK.

The stem, according to Maddock, should be strong and erect, and not less than twelve inches high. The calyx smaller and shorter than that of the carnation, but nearly similar in proportion, as well as in the formation of the flower, which should not be less than two inches and a half in diameter. The petals should be large, broad, and substantial, and very fine fringed or serrated edges, free from deep notches or indentures; in short, they approach nearest to perfection when the fringe or edge is so fine as to be scarcely discernible; but if they could be obtained entire, it would be a desirable object. The broadest part of the lamina or broad end of the petals, should be perfectly white, and distinct from the eye, unless it be a laced pink, that is, one ornamented with a continuation of the colour of the eye round it, bold, clear, and distinct, having a considerable proportion of white in the centre, perfectly free from tinge or spot. The eye should consist of a bright or dark rich crimson or purple, resembling velvet, but the nearer it approaches to black, the more it is esteemed; its proportion should be about equal to that of the white, that it may neither appear too large nor too small.

SILKS AND WINES.

In Dr. Bowring's second Report on the commercial relations between France and Great Britain, presented to both Houses of Parliament, by command of his Majesty, silks and wines form the great subjects, and are likely still farther to engage the attention and the enterprise of this country. They are subjects also that claim some space in our pages, and therefore we shall glance at the contents of the Report.

It is generally agreed that the Chinese were the people who first discovered that, by preventing the escape of the silk-moth from the cocoon, the most beautiful and useful fibres might be produced from such a seemingly worthless object. The date of the discovery, however, is uncertain, although long before the commencement of the Christian era. We need not trace the history of the trade between Eastern and Western Asia in ancient times. At length the Greeks became acquainted with the properties of the silk-worm. It is stated that in the reign of Justinian two monks brought some eggs of this insect in a hollow cane from China to Constantinople, and having taught the Greeks how to hatch the eggs, rear the worms, and wind up the silk, the increase of their produce was so rapidly great, that an open trade in the material was soon the result. The Sicilians, the Italians, Spanish and French, successively became acquainted with the origin and the uses of silk, although the manufacture in most of these countries was long considered of much more importance than the production of the raw material. In England, James I. made an effort to introduce the production of this valuable material, but never in this country has the attempts in this way been as yet completely successful, nor is it likely ever to be prosperous, until the natural history of the worm be perfectly familiar to the persons who may undertake the management of it. In France, where silk is cultivated, this sort of knowledge is so deeply and extensively studied, even as a matter of elementary knowledge, that every peasant can regulate the temperature of the rooms in which the young worms are kept, and otherwise attend most judiciously to their management. Science and facts oppose a prejudice that has very extensively prevailed in England, viz. that the culture of the raw material cannot advantageously be pursued but in foreign countries. Many circumstances, which might be explained, have conspired to prevent its success among a people who have otherwise been so distinguished for their enterprise; nay, the manufacture of the raw material was long very generally supposed not to belong to those who have shewn what wonders they can accomplish with cotton. There is now, however, great attention paid to the growth of silk in India, and it is probable that our possessions in the East will ere long most abundantly and satisfactorily supply our demands. One thing is now certain, that the English silk manufactures have been wonderfully improved by the relaxation of the restrictive system—a system which our readers know, in reference to this article, met with the most strenuous support, in opposition to the principles of free trade. Mr. Dillon, of the extensive house of Morrison and Co., says,—

"My opinion is, that the English silk goods since 1826 have very considerably improved in quality. In evidence of that improvement there are many articles of English manufacture which now successfully compete with French goods, which were excelled by the French at the time of their introduction in 1826; this is particularly the case in the ribbon trade, so much so, that French lutestrings and French satins (in which the French at first excelled) are now almost superseded in this country by the English. In plain gros de Naples, the English have now almost, if not altogether, superseded the French. Even in the richer and better kinds of broad silk goods there is, I believe, a decided improvement. Some watered gros de Naples are, I understand, still imported; I inquired of a person here employed in the watering of silk goods—a person who says he has watered at the rate of 1,200 yards per deim for the last two months; he says that he watered last year, as he calculates, two yards French to one yard English, and that he has this year watered one yard French to two yards English. That must be taken with some allowance, because some French goods are imported ready watered, but still it should be taken for what it is worth, and it confirms my belief that the English silk trade, even in its better classes, is making rapid strides as compared with the French. We have scarcely this season been enabled to import figured lutestrings at all. I am now speaking again of ribbons. We have only imported two patterns, and of satins very few either plain or figured. Our sales in French goods are almost reduced to the single article of French gauzes and to a few peculiar articles. I have already alluded to the Swiss sarsnets, which are now superseded by the English; this is, I admit, in some degree a question of price as well as of quality, but I have no doubt of the great improvement, on the whole, of our manufacture in point of taste as well as of skill. Some very superior patterns have certainly been produced from Coventry this season."

Few will question the mechanical skill of Englishmen; but Mr. Dillon conceives that the French have one decided advantage over us.

"Some persons have stated that there is a prejudice in favour of French over English goods; my own opinion is, that there is no such prejudice at this time; there may have been a prejudice in favour of French goods whilst they were prohibited, and I think it probable that a prohibition would restore that prejudice. There is a preference given to French goods in some articles, which appears to me to be well founded. In the articles of gauze ribbons, and other things, they display more taste. There seems to be more of taste, and more of the artist in their designs; but if English articles were made with as much taste, and as much skill as French ones, the English articles would stand on a par with the French, if not be preferred before them; I mean that there is generally no prejudice, at least I have found none, in favour of French goods."

The cause of this superiority is, that taste in France is a subject of study, as may be learned from Dr. Bowring's statements.

"The very rapid production of new patterns is the real source of French superiority. It is estimated, that not more then twenty-five pieces are, on an average, manufactured of the same design; and there are a great number of patterns woven for samples, which, not being approved, are never transferred to the piece. For the most part, the fancy trade of Lyons is a trade of orders; the patterns having been exhibited to the buyer before the manufacture of the article is undertaken. Hence stocks are low, as are average profits, on account of the smallness of the risk.

"Among the many advantages that Lyons possesses, the school of St. Peter, where a course of instruction in the different departments of art is gratuitously given to about 180 students, must not be forgotten. The course lasts five years; the classes open at nine and continue till two o'clock. The students must be of French birth, and Lyonnese are to be preferred. The city of Lyons pays 20,000 fr. annually for the support of the school, and the government gives 3,000 fr. from the budget of the Minister of Commerce. A botanical garden, a hall of sculpture, a museum of natural history, and an anatomical theatre belong to the establishment. There are professors of the different branches of fine arts, and one whose particular business it is to teach their application to manufactures, and to instruct the students in the manner of transferring the productions of the artist to the loom of the weaver. The students who are advanced, are generally easily located as draughtsmen or pattern producers among the manufacturers, and the school constantly pours forth a supply of talented young men, whose taste is specially devoted to the production of novelties, and who very frequently are admitted to partner-ship in the principal houses, if their creative or inventive powers are of a distinguished order. The gain of an artist is from 3 fr. to 10 fr. or 12 fr. per day, and in some cases, of very high merit, considerably more. The preparation of new patterns is the great concern at Lyons; it commences many months before the season approaches for which they are intended. The success of the most prosperous of the manufacturers may be traced to the *artistical* skill of some one of the partners or dependents. Lyons is constantly sending forth and creating novelties, and receiving fresh impulse from every part of the world which her beautiful productions reach."

At Lyons there is a popular and admirably constituted tribunal, composed of nine master manufacturers and eight weavers of silk, for securing to the inventor of a new pattern the benefit of invention, which together with the school of design, affords the best encouragement to skill and taste in this department of trade.

The process of plain silk weaving is simple enough. Figured weaving is much more complicated, and the history of the Jacquard Loom, which is now generally used in this operation, is not a little interesting, as given by Dr. Bowring before the Committee of the House of Commons, and which he obtained from the inventor himself.

"He told me he was originally a straw hat manufacturer; his attention had never been turned to mechanical topics till the Peace of Amiens opened the communication of France with England; at that time an extract from an English newspaper fell into his hands, in which it was stated that a society here offered a premium to any man who should weave a net by machinery. He told me that his thoughts were thus turned upon this subject, which, by the way, if there had been any interruption to intercourse, would never have taken place: he did produce a net, which he threw aside for some time, and afterwards gave it to a friend as a thing of mere indifference. The net by some means or other got into the hands of the authorities, and was sent to Paris. When some time had passed, and Jacquard had completely forgotten his production, he was sent for by the Prefect, who said, 'You have directed your attention to the making of nets by machinery.' He did not immediately recollect it, but the net was produced to him, and that called it to his mind. The Prefect said, 'I require you to make the machine which led to this result:' he asked three weeks for its completion, and brought it to the Prefect, and desired him to strike with his foot, by which a knot was added to the net. It was sent to Paris, and an order came for his arrest. It was in Buonaparte's time, when things were done in a very rash and arbitrary way. He found himself under the keeping of a gend'arme, and was not allowed even to go home to provide himself with the necessaries for his journey. He was required at Paris, in the Conservatory of Arts, to produce the machine in the presence of inspectors, which he did. He was introduced to Buonaparte and to Carnot, who said to him, with a menace of incredulity, 'Are you the man who pretend to do that which God Almighty cannot do, to tie a knot in a stretched string?' He produced the machine, and showed its operation. This was Jacquard's first mechanical experiment. He was afterwards called in to examine a loom on which twenty or thirty thousand francs had been expended, for the production of articles for the use of Buonaparte. He offered to do that by a simple machine which they were attempting to do by a very complicated one, and, improving on a model of Vaucauson, he produced the mechanism which bears his name. He returned to his native town, a pension of 1000 crowns having been granted to him; but so violent was the opposition made to the introduction of his machine, that he had three times the greatest difficulty in escaping with his life. The Conseil des Prud'hommes, who are the conservators, ex officio, of the interests of the Lyonnese trade, broke up his machine in the public place; the iron (to use his own expression) was sold for iron, and the wood for wood, and he, its inventor, was delivered over to universal ignominy. It was only when the French were beginning to feel the effect of foreign competition that they were forced to employ this machine, which led to such great improvement in their manufacture, and, as every body knows, it is now extensively employed through the whole of the manufacturing districts of France."

As regards the present state of the silk trade between France and England, it appears that smuggling is carried on to an enormous extent, to the defrauding of the revenue annually, it is calculated, of at least 90,000*l.*; the report also satisfactorily shews the mighty advantages which have already resulted from the relaxation of the restrictive system.

"In the course of my examination of the silk manufactures of France, I found, at every step, spontaneous, and often unexpected, testimonies to the great improvement which had taken place in England since 1826. On several occasions English patterns were exhibited which, I was assured by the manufacturers, had suggested to them ideas of improvement, and sometimes, in particular articles, they informed me that they could not exceed in quality, nor produce at a cheaper price. During the prohibitory system the backwardness of the English silk manufacture was a subject of frequent congratulations among the Lyonnese; they met the English as rivals and competitors nowhere; they state now that they meet them everywhere. In 1826, the most intelligent and disinterested observers estimated the average difference, on the whole silk manufactures of France and England, as 40 per cent. to the disadvantage of England, and, in 1832, the relative disadvantage has been reduced to from 20 to 25 per cent."

The value of the silk trade in England may be estimated at about seven millions annually of native manufactures, and one million of imported manufactures; while our exported manufactures in 1834, only amounted to 636,419*l.*, which proves the internal wealth of the community. France consumed less than one-fifth of this amount. Altogether, the British silk trade is considered to be capable of great extension, and if the contemplated application of the power-loom to the weaving of fancy as well as plain goods take place, it is expected that in this branch there will be a rivalship with our cotton manufactures, and that foreign silk goods will be driven from our market.

The wines of France furnish a subject scarcely less interesting than that of silks. France grows 7,000,000 of mulberry-trees, which give 3,000,000 lbs. of raw silk annually, and she possesses 2,000,000 of hectares of vines—the hectare being two acres and seven-eighths of a rood English. The increase in the produce of the French vineyards has been important since 4788. There was a strange law in existence previous to that time, which prohibited any new vines to be planted, or to cultivate any vineyard that had been abandoned for two years.

The average produce of these vineyards is nearly 250 gallons an acre; the wine-sellers in France are 240,000, and the annual consumption in every way is equal to eighteen gallons for each individual, and she exports to England only the three-thousandth part of what she makes. Nor is the consumption of French wines increasing with us.

The distress in the wine trade of France is great on account of the want of a foreign market under the present prohibitory system of her government. Every where the wine-cellars are glutted, nor do the vineyards pay the interest of the capital employed in their cultivation. The wine merchants of Bordeaux in their address to the ministry, have shown that they have an enlightened comprehension of sound commercial principles. They say, in recommending the removal of prohibitions, that, "England will receive our wine in large quantities as well as our brandies, soap, silks, and our various other articles so much sought after by the fashionable world, and we, on our part, shall be enriched and benefitted by her pit coal, metals, cottons, machinery, and looms, and by all those different articles she possesses in abundance, and which imported into France, at a low price, would give a double stimulus to labour. The most enlightened minds on the other side of the straits, have their attention fixed upon us, and the very first show of a good understanding in this respect on our part, will induce them to resume their endeavours to follow up and accomplish the freedom of their commerce."

The account of these valuable and striking Reports might be much extended. Enough has been given, however, to show what important interests in our intercourse with our enlightened neighbours, may still be promoted for the mutual benefit of both, and to inspire us with the hope that our commercial greatness has not yet nearly reached its summit.

USES OF CHARCOAL DUST, AND THE TRANSPLANTING OF ONIONS.

There is a grub that is sometimes very destructive to crops of onions. The ravages of this insect may very easily be perceived by the onion blade assuming a glaucous green colour, and soon after changing to yellow. But if charcoal dust, (which is the refuse that is left at the bottom of a charcoal pit, after the charcoal for use is taken out), be spread upon the top of the ground intended for onions, about half an inch thick, before the seed is sown—the ground being previously well dug and manured—and the top soil mixed with the dust, not the least sign of infection will afterwards appear.

The charcoal dust ought to be kept quite dry, which may easily be done by placing it in a round heap, and covering it closely with turf.

The application of this material has also been found effectual in preventing the clubbing in the roots of cabbages, &c.

Besides the defending of onions against the ravages of the grub, it has been found that the transplanting of onions greatly promotes their growth. All know the effect of the process in the case of leeks, and that these are scarcely thought marketable when they have not been so reared. Why should not the transplanting of onions be equally beneficial? It is practised in Portugal. There they sow the onion seed in November or December, on a moderate hot bed, covered with a few inches of rich good mould, in a warm situation, merely sheltered from their slight frosts by mats. When about the size of a large swan's quill, or about April, they are transplanted on a rich light mould, well manured with old rotten dung, the plants at the distance of about nine inches each way, generally in beds, for the convenience of access, laying the plants flat, covering lightly the beard, and part only of the bulb, with rich mould, well mixed with two-thirds of old rotten dung; watering if the weather is dry, until they have taken root; subsequently now and then breaking the earth by lightly hoeing, and keeping them perfectly clean from weeds. There, they have often the means of watering by irrigation, and if so upon rich soils, the onions grow to a very large size, particularly when the water runs through small heaps of dung. When this is practised, however, or much water given, the onions do not keep so long as in other circumstances. When ripe, the onions are drawn gently from the ground, a twitch is given to the tops, after which they are left to season, where they grew, for a few days. Ere being housed, they are bound into ropes with dry straw, and not permitted to sweat in the heap. Their preservation depends much on their being dry and good when housed, and on their not being bruised. The onion most esteemed in Portugal is thus treated and reared.

ON THE HARDY FRUITS OF THE CANADAS.

There is a profusion of fine fruits produced in Canada. The facility with which apple-trees can be raised from seed, that in a very few years yield abundance of excellent flavoured fruit, astonishes any person who has only been accustomed to see fruit trees raised from grafts or buds. The most valuable apple-trees in that climate, however, are those that yield fruit fit only for cider, as the inhabitants can find a ready sale for their cider, which they cannot obtain for the best fruit.

In Lower Canada considerable attention has been paid to the cultivation of fruit trees; but unless the inhabitants be at more pains than for some time they have been in raising seedlings from their best kinds, it is probable that they will lose them in like manner, as the fine old kinds have degenerated in Britain. It is reported of the island of Montreal, that about forty years ago, it was famed for the quantity and quality of its pears; but now there is little of that fruit in the country, the old trees disappearing fast, and the young ones for the most part being unhealthy.

Apple-trees are also observed frequently to be in an unhealthy condition, both in Upper Canada and the United States, where they have been planted on land that has been cleared for several years, or in cultivation, but on newly cleared ground, they never refuse to grow, and that rapidly and more luxuriously, so that settlers stand much in their own light when they begin to raise apples from seed, whereas, from what has been said, trees obtained from a nursery should at once be chosen and planted.

The Kentish cherry succeeds admirably in North America. They are propagated chiefly from suckers. Peach-trees succeed tolerably well in Lower Canada on walls, with a little protection in winter. In Upper Canada they thrive as standards. They are raised from seed, and often produce blossoms and even seed in the third summer. Quinces are productive on the Niagra river. They are fine flavoured, and free from the smell of the quinces in England.

ON THE CULTIVATION OF GINGER.

Fresh roots of ginger are very much in request in many families for preserving, but the usual method of growing them in pots or boxes in a stove, affords but a scanty supply. Mr. Christie Duff, when gardener at Bretton Hall in Yorkshire, put the following plan in practice several years ago, to overcome this deficiency, as described in the sixth volume of the London Horticultural Transactions.

In March he took some old roots and divided them, leaving one eye to each piece. These pieces he potted separately in small pots (sixty size), and placed them under a frame in a hot-bed. When they had shot from a foot to eighteen inches, which was about the middle of May, he turned out the plants, under glass, into a sunk brick pit, which had been built to protect hardy greenhouse plants in winter, the surface of which was three feet from the glass, in order to leave room for the plants to grow. The bed under the mould was made up of a mixture of stable-dung and oak-leaves, the heat produced from which supplied warmth sufficient for the plants, exclusive of what was afforded by the sun. The soil in the bed did not exceed six inches in depth. The plants were kept without air, that is the lights were not left open at all. In hot weather, water was given to the plants daily.

Under the above treatment the ginger grew rapidly, and in September was taken up for use; and Mr. Duff states, that he has frequently obtained roots which weighed five ounces each. After September, the plants, if left in the ground, begin to decline, and the roots at that time, and under these circumstances, become stringy.

DOUGLAS, THE BOTANIST.

The intelligence of the death of this enterprising traveller and botanist will be read with feelings of the deepest regret, by every one acquainted with the eminent services he has rendered to botany and other branches of natural history, in the course of the last twelve years. His name, in fact is associated with all the rare and beautiful plants lately introduced from North-West America, which, by means of the Horticultural Society of London, have been extensively distributed not only in Britain, but over Europe. To him we are indebted for the elegant *Clarkia*, the different species of *Pentsemons*, *Lupines*, *Œnotheras*, *Ribeses*, and a host of other ornamental plants, which have formed the great attraction of the several botanical publications wherein they have been figured and described.

Mr. Douglas was born at Scones, near Perth, and served his apprenticeship as a gardener in the gardens of the Earl of Mansfield. About the year 1817, he removed to Valleyfield, the seat of Sir Robert Preston, Bart., then celebrated for a choice collection of exotics, and shortly afterwards went to the Botanic Garden of Glasgow. Here his fondness for plants attracted the notice of Dr. Hooker, Professor of Botany, whom he accompanied in his excursions through the Western Highlands, and assisted in collecting materials for the "Flora Scotica," with which Dr. H. was then engaged. This gentleman recommended him to the late Secretary of the Horticultural Society, Joseph Sabine, Esq., as a botanical collector; and in 1823 he was despatched to the United States, where he procured many fine plants, and greatly increased the Society's collection of fruit-trees. He returned in the autumn of the same year; and in 1824, an opportunity having offered through the Hudson's Bay Company of sending him to explore the botanical riches adjoining the Columbia River, and southwards towards California, he sailed in July for the purpose of prosecuting his mission. In one of his letters now before us, he thus speaks on leaving England:—"I had a fine passage down the Channel, and cleared the Land's End on the 1st of August. The day was warm, with a clear sky; the evening cool and pleasant. I stood on deck looking on the rocky shores of Cornwall, burnished with the splendour of a setting sun—a noble scene. By degrees the goddess of night threw her veil over it, and my delightful view of happy England closed, probably closed for ever!"

When the vessel touched at Rio de Janeiro, he collected many rare orchideous plants and bulbs. Among the latter was a new species of *Gesneria* which Mr. Sabine named in honour of its discoverer, *G. Douglasii*. He was enraptured with the rich vegetation of a tropical country. He stopped at Rio longer than he anticipated, and left it with regret. In the course of his voyage round Cape Horn, he shot many curious birds peculiar to the southern hemisphere, and prepared them for sending home. On Christmas-day he reached the celebrated island of Juan Fernandez, which he describes as "an enchanting spot, very fertile and delightfully wooded. I sowed a large collection of garden seeds, and expressed a wish they might prosper, and add to the comfort of a second edition of 'Robinson Crusoe,' should one appear."—He arrived at Fort Vancouver, on the Columbia, on 7th of April, 1825. Here an extensive field presented itself to him; and the excellent manner in which he performed his duty to the Horticultural Society cannot be better exemplified than by referring to the vast collections of seeds which from time to time he transmitted home, along with dried specimens, beautifully preserved, and now forming part of the Herbarium in the garden of the Society at Chiswick. Of the genus *Pinus* he discovered several species, some of which attained to an enormous size; the *Pinus Lambertiana*, which he named in compliment to Aylmer Bourke Lambert, Esq., Vice-President of the Linnæan Society, is perhaps the largest of the whole. One of these, which had been blown down, measured 215 feet in length, and 57 feet 9 inches in circumference, at three feet from the ground. The cones of it, which Mr. Douglas sent home, and which we have seen, were sixteen inches long, and eleven inches in circumference. The kernel of the seed is sweet and pleasant to the taste, and is eaten by the Indians, either roasted or pounded into coarse cakes for winter store. The resin which exudes from the trees when they are partly burned, loses its usual flavour and acquires a sweet taste, in which state it is used by the natives as sugar. Another species, named by Mr. Sabine *Pinus Douglasii*, attains nearly the size of the above.

In the spring of 1827, Mr. Douglas traversed the country from Fort Vancouver, across the Rocky Mountains to Hudson's Bay, where he met Capt. (now Sir) John Franklin, Dr. Richardson, and Captain Back, returning from their second overland Arctic expedition. With these gentlemen he came to England in the autumn, bringing with him a variety of seeds, as well as specimens of plants and other subjects of natural history. Through the kindness of his friend and patron, Mr. Sabine, he was introduced to the notice of many of the leading literary and scientific characters in London; and shortly afterwards he was honoured by being elected, free of expense, a Fellow of the Linnæan, Geological, and Zoological Societies, to each of which he contributed several papers, since published in their "Transactions," evincing much research and acuteness as a naturalist. A handsome offer was made to him by Mr. Murray, of Albemarle-street, for an account of his travels, which he commenced preparing for the press, but which, we grieve to say, he never completed. Some entertaining extracts from his letters to Dr. Hooker were published in Brewster's "Edinburgh Journal" for Jan. 1827; and a genus of plants belonging to the natural order *Primulaceæ* was dedicated to him by Professor Lindley, and defined in "Brande's Journal" for Jan. 1828; but it will scarcely be credited in this enlightened age, when there are so many channels open for communicating information, that the interesting journal of his travels, which we have seen and read, has been allowed to slumber unregarded in the archives of the Horticultural Society in Regent Street.

After being in London for two years, Mr. Douglas again sailed for Columbia in the autumn of 1829, where he has since been enjoying his favourite pursuit, and adding largely to his former discoveries. We were in expectation of his return by the very ship which has brought us the tidings of his horrible death—an event the more to be regretted from having been occasioned by circumstances which we shudder to contemplate—that of falling into a pit made by the natives of the Sandwich Islands for catching wild bulls, one of the latter being in it at the time.

Such, we understand, has been the unfortunate destiny of our intrepid friend and countryman, at the early age of thirty-six. Having known him intimately from a boy, we feel a mournful pleasure in looking back to the many hours spent in his society, and deeply deplore his untimely fate.

NOTICE OF THE LATE PROFESSOR BURNETT.

Gilbert Thomas Burnett, the son of the late Gilbert Burnett, Surgeon of Great Marylebone Street, was born in 1800. At an early age he imbibed those botanical impressions, which he afterwards perfected into science, so much to his own honour and the advantage of society. He also at an early age acquired the solid foundation of his moral and classical career. He was articled to an eminent surgeon and apothecary, and assiduously applied to all the branches of the medical profession, but Medical Botany was always the subject of his study, which he may be said to have chiefly contributed to establish as one of the most important bases of a regular medical qualification. He has himself said, that when at "only fifteen years of age, I became a student in the London Schools, Medical Botany was at its lowest ebb. It had become almost a bye-word of reproach, and the study entailed both on teacher and on pupil sarcasm and reproach."

Though Mr. Burnet most probably might soon have commanded an extensive professional practice, his predilection was to become a teacher of Botany, which was seconded by a public call for such instruction. His first lectures were delivered in the Anatomical School of the celebrated John Hunter, and these procured him the honorary appointment of Professor of Botany to the Medico-Botanical Society. He now commenced the instructing of students, in the science, by herbarizing excursions during the summer months, thus immediately through nature reaching its most interesting features and plain principles. Besides his lectures at the places named, and St. George's Hospital, his excursions, and his practice as a surgeon, he still found opportunities to write on his particular science; several of these papers, which possess the highest interest to botanists, are to be found in the Journals of the Royal Institution, at the Theatre of which he regularly delivered lectures during several seasons, contributing also discourses from the stores of his various knowledge on subjects of patriotic and popular interest in connection with his science, at the evening *conversazioni* of that institution. Having now obtained the well-earned reputation of an accomplished Botanist and lecturer, he was elected Botanical Professor in King's College on its opening, and it may now be said, he attained the height of his ambition; for with his elevation he secured the attendance and the genuine attachment of a numerous class of students. But his brilliant and rapid career was doomed to an early termination.

Besides the places which we have named, where Professor Burnet delivered lectures, several others might be mentioned. We shall only particularize his appointment of Professor of Botany to the Honourable Company of Apothecaries, and Demonstrator of Botany at Chelsea Botanic Garden. Of his literary works, we must name a new and beautiful edition of Dr. Stephenson and Churchill's Medical Botany, in 3 vols. 8vo.; and his own two large volumes of "Outlines of Botany," which is a celebrated production. But his numerous and incessant labours hurried him to his grave. He died on the 27th of July, 1835, leaving behind him an eminent and honourable fame. We shall not indulge in eulogy, but as a specimen of his view of botany, insert an abridged outline of his usual hospital course, which possesses a remarkable clearness and copiousness.

"*Division I.*

"ORGANIC BOTANY, OR VEGETABLE PHYSICS.

"Sect. 1. *Anatomy of Plants.*—External members, intermediate textures, and intimate structures, i. e. compound, component and constituent organs; viz. 1. root, stem, bud, leaf, flower, fruit. 2. Tegument, bark, wood, pith. 3. Vessels, tissues, humours, &c.

"Sect. 2. *Phytochymics.*—Influence of vegetable life on matter. Proximate, component, and constituent or elementary principles of plants. Conversion of inorganic into organic matter. Retrogression of organised bodies into the inorganic state. Exuviæ, fossils, &c.

"Sect. 3. *Vegetable Physiology.*—Organs of nutrition, extension, and reproduction. Postulates, and phenomena of growth and increase. Metamorphoses regular and irregular, transitional and vicarious. Functions of the vascular system. Absorption, motion, course, and assimilation of the sap. Respiration, transpiration, secretion, &c. Electrical states of plants. Fertilisation, dissemination, germination, &c. Irritability of vegetables, Motions, and apparent instincts. Vigils, sleep, torpidity, &c.

"Sect. 4. *Natural History of Plants.*—Habitats, migrations, &c. Fossil botany. Extinct flora of the ancient world. Effects of soil, climate, culture, &c. Disease, decay, and death, in vegetables. Physical importance of these changes. Their results.

"*Division II.*

"SYSTEMATIC BOTANY.

"Sect. 1. *Taxonomy, or the Laws of System.*—Illustrations of the philosophy of system. Principles of arrangement in general. Methodical distribution, as practically applied to vegetables in particular. *Analytic Scheme.* Of nature, the organic realm, the vegetable reign, and its distribution into regions, classes, orders, types, &c. *Synthetic Scheme.* Distinction and arrangement of varieties, species, genera, &c.; further alliances, as kinds, sections, types, orders, classes, &c. Characters of these progressively associating groups. Distribution rather than division the object of rational system.

"Sect. 2. *Glossology, or the Language of Botany.* Principles of nomenclature. The organs of plants considered as diagnostic signs. Botanical characters equivalent to technical terms; the modification of such parts, being the inflexions of this symbolic writing. Every plant bears its name inscribed upon it. Mode of translating these types or emblematic words into ordinary language; i. e. the use of botanical characters as indexes to unknown plants. Ancient and modern, classic and barbarous names: laws of their imposition, change, retention, &c.

"Sect. 3. *Diagnosis of Plants*, by the so-called natural and artificial schemes. Characteristics and peculiar advantages of each: their differences, and the mode in which they may be rendered consentaneous.

"Sect. 4. *Historical Sketch* of the progress of botany, from the earliest times to the present day.

"*Division III.*

"ECONOMIC BOTANY.

"Sect. 1. *Medical Botany.*—Practical application of the science to the distinction and description of medicinal plants: including such as were formerly esteemed, but are fallen into disrepute; as well as such others as might probably with advantage be introduced. Of the proximate principles of vegetables, especially those on which their peculiar properties appear essentially to depend. Educts of vegetables; products of their decomposition. *Botanical Toxicology.* General and particular characters of vegetable poisons, their effects, diagnostic symptoms, antidotes, &c. *Pharmaceutic Botany.* Collection and preservation of medicinal plants, and officinal substances of vegetable origin.

Sect. 2. *Dietetic Botany.*—Characters and properties of esculent vegetables. Beneficial and injurious effects of certain plants as food, both in health and in disease.

"Sect. 3. *Botany of the Arts.*—Notices of certain plants important in commerce or the arts (otherwise than as food and medicines), whether useful or ornamental, as affording timber, fuel, dyes, &c.

"Sect. 4. *Culture* botanically considered, as affecting the perfect evolution of the vegetable body, and the full development of its peculiar powers.

"Sect. 5. Art of making anatomical preparations. Exsiccation and humid preservation of entire specimens. Formation maintainence and arrangement of herbaria. Use of botanic gardens. Practical demonstrations, indigenous herbarisings, &c. &c."

ON TRANSPLANTING EVERGREENS AND ALSO LARGE DECIDUOUS TREES.

Mr. James Stuart, gardener to Sir John Hope, at Pinkie, has practised the following method of transplanting, as he has himself described it, for upwards of thirty years. The first thing to be attended to is the preparation of pits for receiving the trees. The distance of the pits may be eight or twelve feet apart, at pleasure. Their size must be regulated according to the size of the plants to be placed in them; say from five to eight feet in diameter, and from two to three feet in depth. They should, however, be fully wider at the bottom than the top. The process of digging is thus conducted—pare off the surface to the depth of the grass or weed roots; lay it in two distinct heaps opposite each other; then dig out the best earth, disposing it in the same manner. If the earth happen to be of a strong clayey nature, it will be much improved by carefully compounding with it sand, peat-earth, or vegetable mould. The subsoil is to be laid out in the same manner.

In raising the trees or plants, it is necessary first of all to gather the branches together with the hands, and to tie them with a cord from bottom to top. Then draw a circle on the earth around the plant in proportion to its size. Plants of six or seven feet in height, will require a circle three feet in diameter. Next, carefully dig a trench about two and a half feet on the outside of the circle, and to such a depth that its bottom shall be six inches below the roots of the tree, carefully paring round the circle, so that the ball of earth may be preserved entire. When the ground is of a gravelly nature, it will be necessary to begin at the bottom of the ball, and wrap it closely round with hay-ropes till you come within a few inches of the surface. As ground of this kind is apt to fall from the roots, it will be necessary to raise the plant gently on one side, to place under it a little straw, and to bind this with hay-ropes. Then raise it on the other side, and secure it in the same way. In order to lighten the ball as much as possible, pare off a little earth from the top of it to the depth of the surface-roots. That the plant may be safely conveyed to the place intended for it, a deal-bottomed hand barrow and truck are required. The plant is placed on the barrow by raising it on one side, pressing on the edge of the barrow, and sliding the plant gently on till it be fairly balanced.

In placing the plant in the pit, the steels of the barrow must be laid fifteen or eighteen inches over it, in which one or two persons stand ready to receive the plant. Let one or two then raise the other end of the barrow to such a position that the plant may slide gently into the centre of the pit. The hole must always be adjusted to the depth of the ball of earth around the plant, so that the surface-roots may be within four or five inches of the level of the ground. Observe next to put the prepared earth around the sides of the ball, and the surface or needy earth between it and the insides of the pit. Fill it up in this manner to within three inches of the surface of the surrounding earth. Put in then a quantity of decayed leaves of trees, to the depth of three inches, and cover the whole with the inferior earth which was taken from the bottom of the pit, to the height of three inches above the ordinary surface of the ground. Let a ring be formed around the outside of the circle about two inches deep, and let the rest of the earth gradually incline downwards to the centre of the plant, somewhat in the form of a basin. Previous to this process, care must be taken that the earth be trod down with the feet, but at such a distance as not to injure the ball. Untie the branches, then pour upon the plant from ten to twenty large watering pots of water, in proportion to its size. If the weather should prove dry afterwards, it is proper to squirt the leaves in the evening with water, resembling the falling of dew.

After the plantation is finished, it is advisable to trench the intermediate spaces, and, if the ground permit, to the depth of eighteen or twenty inches, even although a little of the subsoil should be turned up. These spaces may be cropped with carrots for a year or two; and the ground must be kept clear of weeds. It is much easier to plant before the trenching than afterwards. Besides, the ground in that case is not trod upon, but left in a more open state to receive the young fibres. Mr. Stuart considers the three last months of the year to be the best for transplanting.

His method of transplanting forest trees of a size from ten to twenty-five feet high, and measuring, breast high, from five to eighteen inches in circumference is very simple. He first fixes the intended distances at which the transplanted trees are to stand from each other, regulating the size of the pits according to that of the trees, and leaving the bottoms loosened, that the roots may the more easily penetrate it. In taking up the trees, if ten feet high, describe a circle four feet in diameter; if twenty-five feet high, seven or eight feet must be the distance, and so on in proportion to the size of the trees. This trench must be dug to such a depth, that its bottom may be six inches below the general run of the horizontal roots. Care must be taken in digging under the roots, and the earth must be separated from them by breaking it down into small portions, lest the roots be twisted or broken. For this purpose, a triple pronged fork is useful. When got completely under the tree in one quarter of the circle, it is necessary to tie those roots together which have been cleared of the earth, and to cover them with a mat, lest they should be injured by being exposed to the air. If the ground be gravelly, a short-handled pick will be necessary in undermining the roots. If the tree have several contending tops, cut off all except the most promising, and if the branches be very numerous, thin them moderately in proportion to the number of the roots. The tree is then to be carefully conveyed to the intended pit. Place it upright in the centre of the pit, adjusting the depth of it to the proportion of the roots, using the surface earth for this purpose, so that the surface roots, when in a horizontal position, may be four inches below the level of the ground. In planting, observe to point the leading top of the tree in general to the south-west, or in that direction from which the strongest and most prevailing winds are found to blow. The best earth is filled in for one foot around the tree, up to the place from which the roots first strike off, taking care to pack it firmly with the hand under the tree, and to fill up all the vacuities between the roots. The planter must keep his feet fixed in one position, proceeding to lay out the undermost set of roots as far as he can reach with his hand, in a horizontal direction, covering them with three inches of earth, and so proceed until he arrive at those on the surface. All injured and broken roots must be cut; the others should be made smooth at the end as they are laid out, and if the smaller ones be numerous, a portion of them should be removed, and the rest carefully combed out. Similar directions to those given in the case of evergreens must afterwards be attended to. In this manner Mr. Stuart for many years has been in the practice of transplanting forest-trees, and long before he ever heard of the process observed at Allanton Park. Forest-trees according to his experience, may in general be planted with success, in mild weather, from the time that they throw their leaves, till the bud be again considerably swelled.

Regarding his mode of pruning, he forms the bare stems of trees, from eight to twenty-four and twenty-eight feet high, according to pleasure, otherwise shaping the tree in the best manner of which it is susceptible. Mr. Stuart considers summer to be the best season for pruning. He thinks it also of great advantage to plant the spaces between the trees with evergreens at ten or twelve feet apart, and the outside doubly thick. These afford shelter to the plantation, and add to its beauty.

In the manner explained, Mr. Stuart has planted upwards of a thousand large trees; such as oaks of different sorts, elm, beech, Spanish chesnut, walnut, sycamore, ash, thorn, black Italian, poplar, &c.

DESCRIPTION OF THE PLATES.

CROWEA SALIGNA.

WILLOW LEAVED CROWEA.

Decandria Monogynia.

Rutaceæ.

Gen. Char.—Calyx five-parted. Petals five, sessile. Stamens flat, subulate, connected by entangled hairs. Anthers united lengthwise to the filaments on their inner side. Style from the base of the ovary. Capsule five united; seed with an arillus.

Spec. Char.—Leaves lanceolate, smooth on both sides, quite entire, flowers solitary from the bottom of the leaves close to the stem.

The willow-leaved Crowea continues in flower the greater part of the summer. The brilliancy of its bright purple flowers renders it a deserved favourite.

An equal mixture of sandy loam and peat is the best soil for it, and care must be taken not to overwater it. It likes an airy situation, and not to be crowded among other plants; and is readily increased by cuttings, which strike root freely in sand under a bell-glass. Native of New Holland.

CISTUS CANDISSIMUS.

CANARY ISLAND CISTUS OR ROCK ROSE.

Polyandria Monogynia.

Cistineæ.

Gen. Char.—Calyx of five petals, two outer ones unequal, or absent. Capsule covered by the calyx, five-celled, from bearing a dissepiment in the middle of each valve.

Spec. Char.—Leaves ovate elliptical, acute, densely clothed with hoary tomentum, three-nerved; foot-stalks short and sheathing at the base, with pilose margins; peduncles solitary, one-flowered, shorter than the leaves; inner sepals one half shorter than the rest.

Stem woody, erect, much branched; branches clothed with soft tomentum. Flowers of a pale rose colour, with yellow unguis, margins of petals slightly crenulate. Stamens about two hundred; pollen orange-coloured. Germen sericeous. Style smooth, flexuose, nearly double the length of the stamens. Stigma capitate, tuberculate.

This fine species is a native of the Canary Islands, but is not sufficiently hardy to bear our winters in the open air, except it be well covered up with mats in severe weather, and by litter laid about its roots.

It succeeds well in a light sandy soil, and may be propagated by cuttings planted under hand-glasses, or by seeds, which it sometimes ripen.

CISTUS ALPESTRIS.

ALPINE SUN ROSE.
Polyandria Monogynia.
Cistineæ.

Spec. Char.—Stem suffruticose, procumbent, branched; branches pilosely hairy; leaves greenish on both surfaces, oblong-elliptical, rather glaucous, or with hairs in fascicles, stalked, upper leaves almost sessile; pedicels and calyxes pilosely hairy; hairs cinerous.

Stem branching in all directions. Flowers terminate in short secund racemes, of a bright yellow. Pedicles slender, thickly clothed with white hairs. Calyx of five unequal sepals, very hairy; two outer ones very small, lanceolate, scarcely more than half the length of the other; inner ones oblongly lanceolate, concave, bluntish. Petals five, twice the length of the calyx, flat, imbricate nearly all their length. Stamens thirty to forty, unequal in length. Germen hairy. Style, twisted at the base. Stigma capitate, three-lobed.

It is a native of various parts of Europe, growing in rocky mountainous situations, and is well adapted for the ornamenting of rock work, or for growing at the front of flower borders, where its lively blossoms, which continue in succession for a considerable time, make a handsome appearance.

It is readily increased by cuttings taken off in the young wood as soon as ripened, and planted under hand-glasses.

HYACINTHUS CORYMBOSUS.

CORYMB FLOWERED HYACINTH.
Hexandria Monogynia.
Asphodelia.

Gen. Char.—Corolla bell-shaped, with three honied pores by the germ.

Spec Char.—Corollas funnel-formed; raceme erect, scape shorter than the leaves.

Leaves linear, very narrow, commonly three, shorter than a finger's length. Scape very short, terminated by a corymb of purple flowers, cloven half way down. Three stamens the length of the corolla, and the other three half the length. Style the length of the corolla.

This pretty plant is a native of the Cape of Good Hope. It requires to be cultivated in a light sandy soil, and is readily increased by offsets from the bulbs.

RHEXIA GLUTINOSA.

GLUTINOUS RHEXIA.
Octandria Monogynia.
Melastomaceæ.

Gen. Char.—Calyx urceolate four-five cleft. Petals four, inserted in the calyx, oblique. Anthers declinate. Capsule setose, four-celled inside the calyx. Receptacle lunate. Seeds numerous, cochleate.

Spec. Char.—Leaves elliptical, three-nerved.

A shrub three or four feet high, divided at the base into several branches, smooth in all its parts, except the calyxes, the bracteas, and the top of the young branches—which are covered with a viscid, glutinous substance. Leaves elliptical. Flowers fascicled. Calyx one-leaved bi-bracteate; tube spherical, limb four-fid; lacine ovate. Corolla four-petalled. Petals oval and of a violet colour. Stamina eight, erect, as long as the corolla; filaments white. Ovarium superior, smooth. Style erect, as long as the stamina. Stigma acute. Capsule globose, four-valved, four-celled, many-seeded.

The rhexia glutinosa is a very fine shrub, flowering in the months of August and September, and is remarkable for the delicate green of the leaves, and the beautiful violet of its flowers.

It is a native of New Granada, thrives best in a mixture of sandy loam and peat, and is readily increased by cuttings.

TIGRIDIA PAVONIA.

RED-FLOWERED OR MEXICAN TIGER-FLOWER.
Monadelphia Triandria.
Irideæ.

Gen. Char.—Spatha two-leaved. Calyx 0. Petals six, the three outer large. Filaments united into a very long tube.

Spec. Char.—Stem simple, wavy. Leaves ensiform, nerved. Petals flat, inner small pandariform.

Root bulbous. Scape a stem high, one-flowered. Leaves sheathing, one or two; the lower ones longer and narrower. Spathe two-leaved, compressed. Corolla bell-shaped; the three outer petals larger, ovate at the tip, a little truncate with a minute dagger point; the three inner alternate, one third of the size, hastate, subsessile, spotted. Filaments sheathing the style. Anthers three, linear, nearly the length of the stigmas. Germ pedicelled. Stigmas two-parted, filiform. Capsule linear.

This splendid plant, the petals of whose flowers are marked something like the skin of a tiger, is a native of Mexico, and tolerably hardy.

It does best when planted in sandy peat, and protected by a frame or hand glass; but will also thrive in sheltered borders, provided it is protected from the winter's frost.

It ripens seed, from which or from offsets, it may be readily increased.

RHEXIA MYRTOIDEA.

MYRTLE-LIKE RHEXIA.
Octandria Monogynia.
Melastomaceæ.

Spec. Char.—Leaves sub-lanceolate, oval, entire, three-nerved smooth flowers solitary, axillary. Calyx sub-clavate, glabrous.

A shrub two feet, high, glabrous. Branches opposite, cylindrical. Leaves oval, membranaceous, bright green. Flowers solitary, in the axils of the leaves, bright violet. Peduncles short, cylindrical. Corolla of the same size as the calyx. Stamina inserted into the calyx. Style of the same length as the stamina. Capsule four-celled, four-valved, many-seeded.

The Rhexia Myrtoidea grows naturally in the kingdom of Mexico. Humboldt, who first discovered this plant, says it should be cultivated in a very humid earth, and being capable of taking different shapes, he considers it would, from the beautiful violet of its flower, form a very great ornament in our gardens, and is readily increased by cuttings.

TRILLIUM FŒTIDUM.

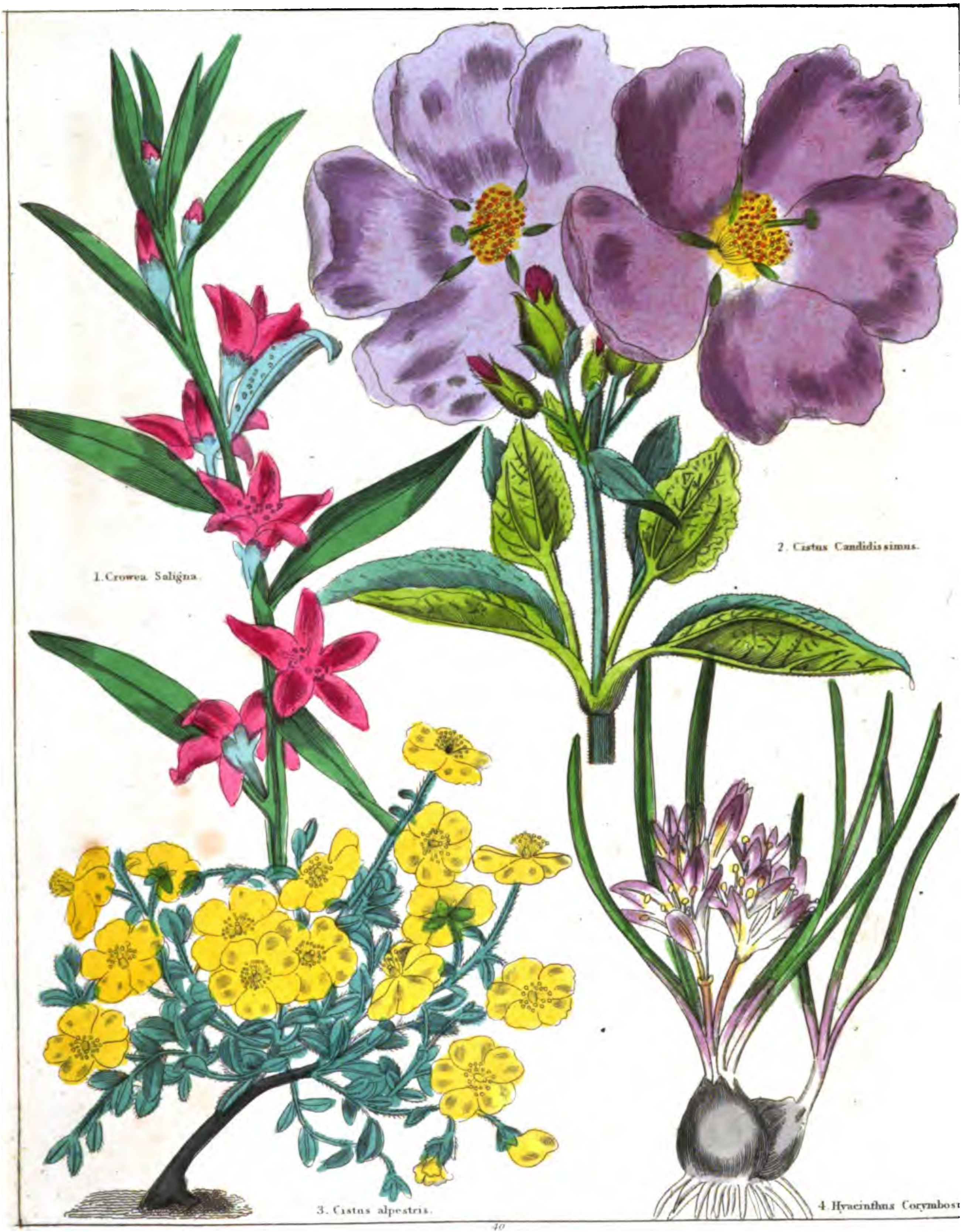
STINKING TRILLIUM.
Hexandria Trigynia.
Melanthaceæ.

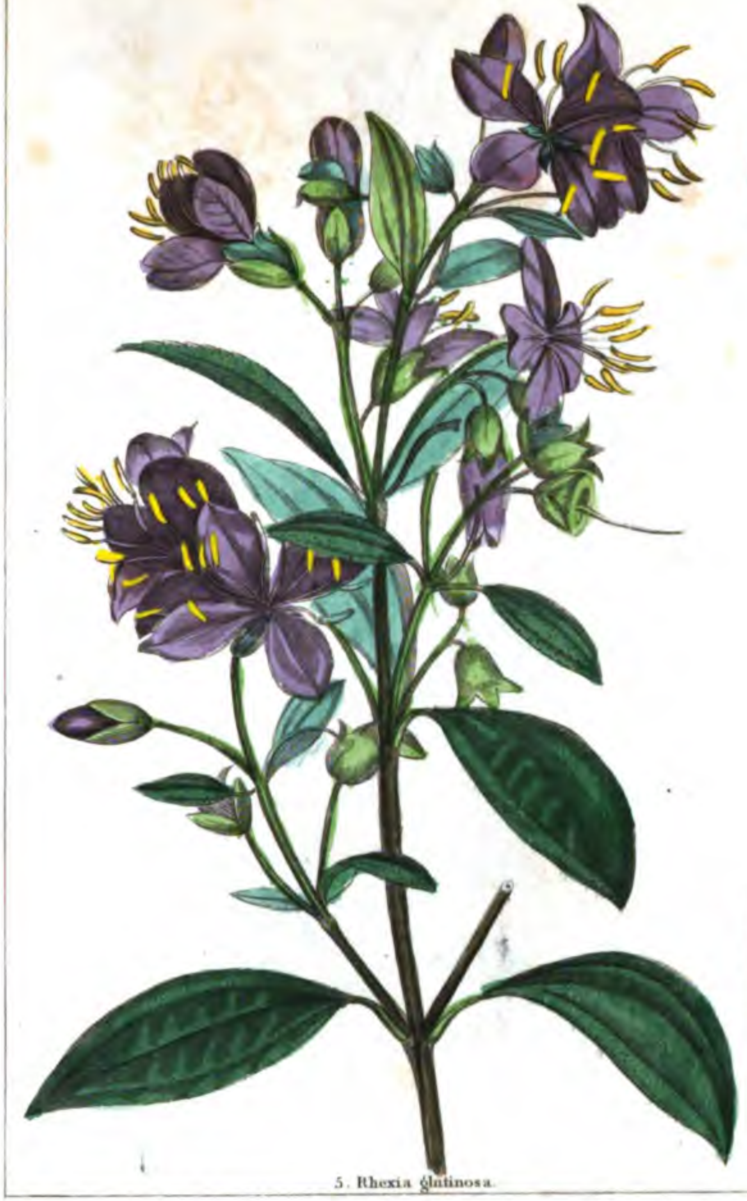
Gen. Char.—Calyx of three leaves. Petals three. Berry of three cells.

Spec. Char.—Flower stalk erect; flower inclining; petals elliptical, spreading, the length of the calyx. Leaves rhomboid, pointed, sessile.

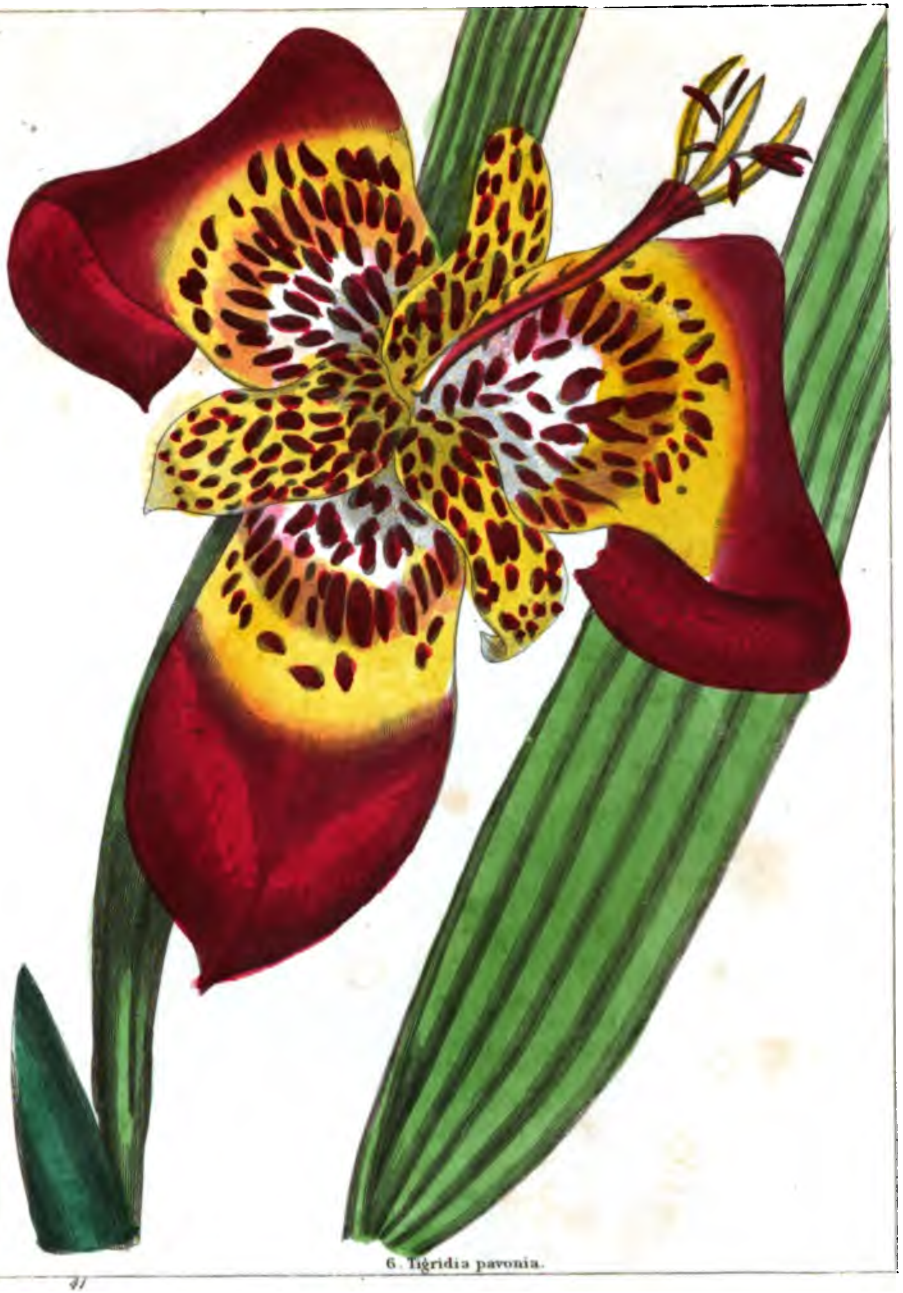
The leaves are three, in form like a broad lozenge. Flower very fœtid, like carrion. They appear in April and May. Fruit dark mahogany colour. Native of North America.

It is propagated by seeds, which should be sown upon a shady border soon after they are ripe, and then the young plants will come up the next spring; but if the seeds are sown in the spring, they will remain in the ground a year. When the plants come up, they require to be kept clear from weeds, and in autumn, after their leaves decay, the roots transplanted to a moist shady place, where they are to remain.

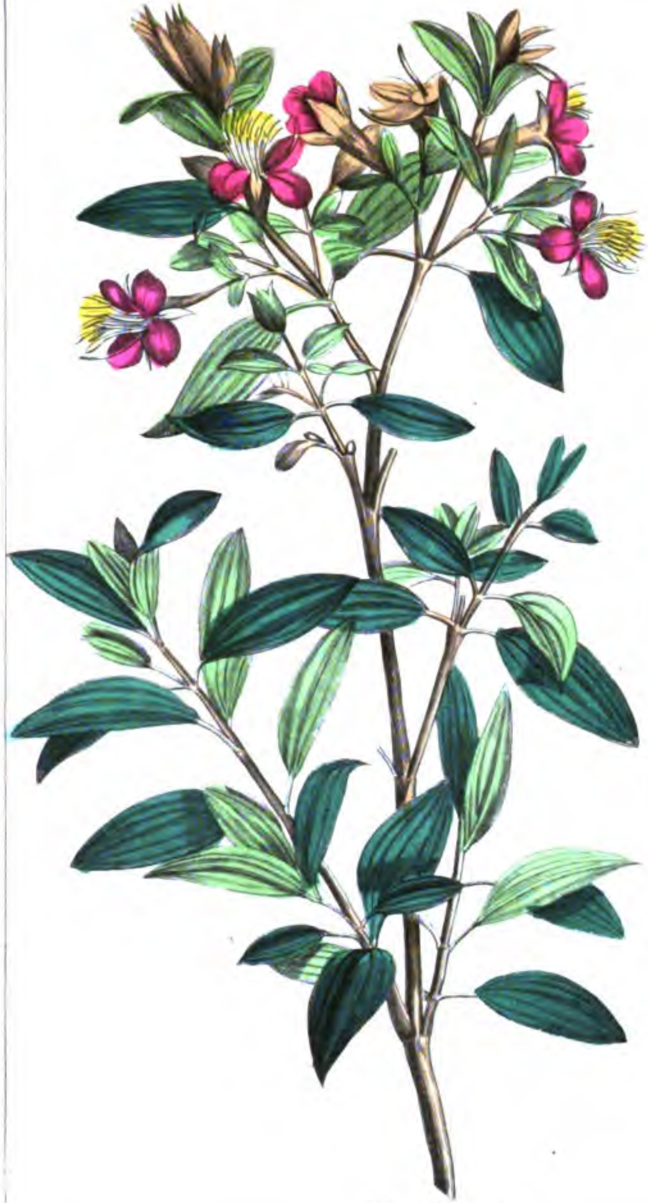

1. Crowea Saligna.
2. Cistus Candidissimus.
3. Cistus alpestris.
4 Hyacinthus Corymbos



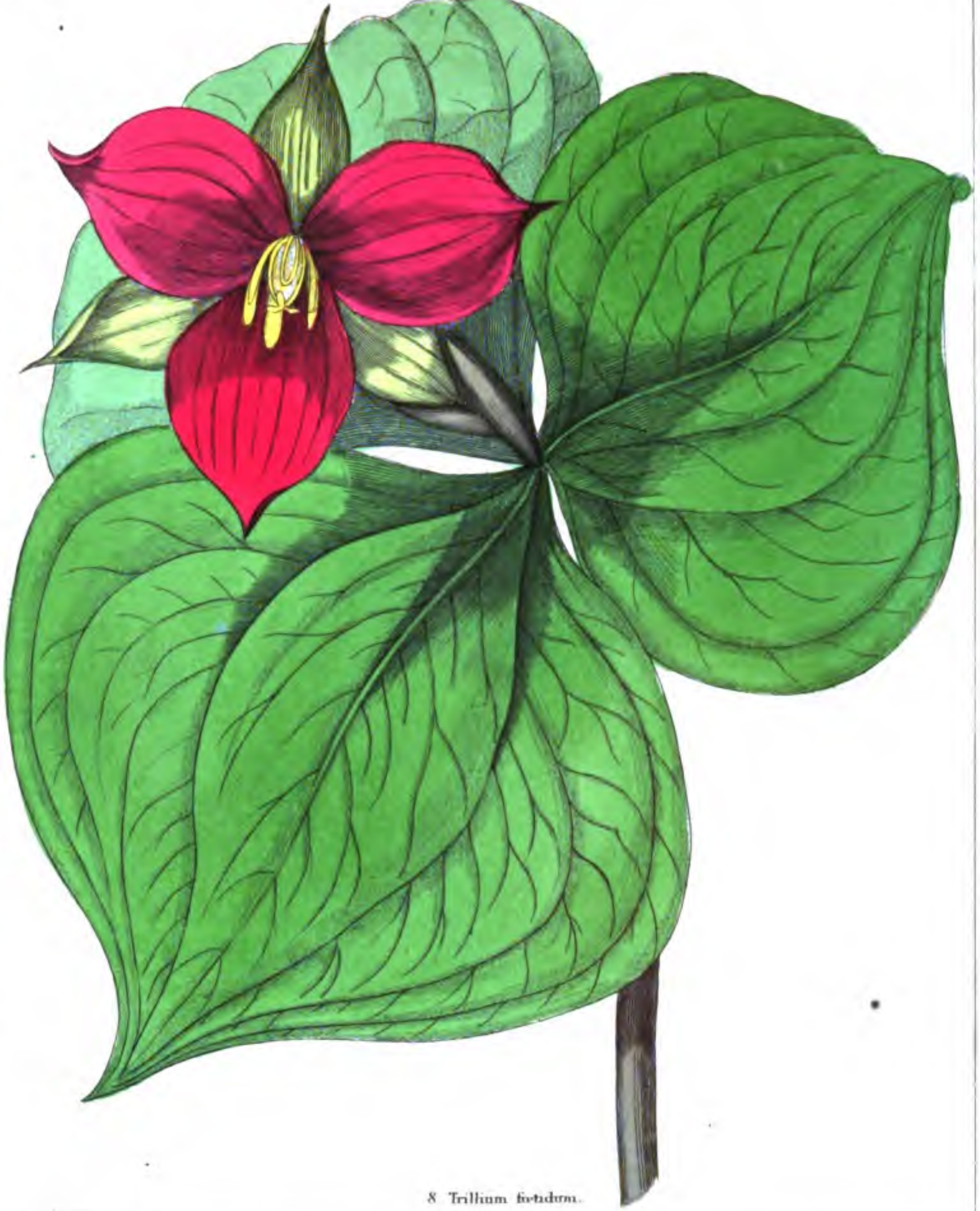
5. Rhexia glutinosa.



6. Tigridia pavonia.



7. Rhexia Myrtoidea.



8. Trillium fœtidum.

THE
MAGAZINE OF BOTANY, GARDENING,
AND
AGRICULTURE,
BRITISH AND FOREIGN.
MARCH, 1836.

PLANTS GROWING IN THE NEIGHBOURHOOD OF CONSTANTINOPLE.

MANY of these plants are of course the same with those described by Theophrastus, Dioscorides, and Pliny. Others seem to have escaped them, or in their days to have been unknown. Dr. Walsh, a corresponding member of the London Horticultural Society, some years ago made a collection of the seeds of all the trees and shrubs, as also of the esculents in the neighbourhood of Constantinople, that are prized there, or not common in England, and transmitted some account of them, which we shall much abridge. He begins with trees and shrubs.

Cercis Siliquastrum abounds in the country in question. It is found clothing the shores of the Bosphorus, and the sides of Mount Libanus. It is very beautiful in all its stages. Very early in spring, flowers of a bright pale red burst out before any leaf appears, not only from every part of the branches, but from the trunk, piercing the thick strong bark nearly down to the root, in a very remarkable manner; and it is, for this reason, called *red bud*. These buds are gathered, and used, with other raw vegetables, by the Greeks and Turks, in salads, to which they give an agreeable flavour and colour. It is everywhere planted on account of its beauty. It is hardy, and bears well the winter of that climate, which, being so near the Black Sea, is sometimes very severe. It does not seem to have been known or described by the ancients.

Ceratonia Siliqua was known to the ancients. It is almost the only tree that grows at Malta—relieving the irksome sameness of the white stone enclosures with its dark foliage. The substance of the pod is thick and pulpy, remarkably sweet and nutritious. Pliny calls it *siliqua prædulcis.* It resembles manna in taste and consistence. But the circumstance that has rendered it famous, is the controversy, whether it was not the real food of St. John in the wilderness. It is certain that it grows in great abundance in Palestine, where its produce is used at this day for food, whence it is sent to Alexandria, and thence over the Mediterranean, as far as Constantinople, in the vicinity of which it does not grow. The Franks call it St. John's Bread.

Celtis Australis is a large tree, very common. Its leaf is rough, and nearly resembles a nettle, and hence it is sometimes called the *nettle tree.* It bears a berry, which changes its hue from light yellow to dark brown, and has a sweet, pleasant taste; hence it is conjectured to be the tree which Homer says has so sweet a taste, that those who eat it, forget their own country.

Cupressus Horizontalis is supposed, by Pliny, to be the male of the cupressus sempervirens, and modern botanists consider it only a variety; but Dr. Walsh says, it is undoubtedly a different species, the character of the whole tree being distinct and permanent. Its branches project horizontally as those of an oak, and it resembles a pine, rather than a cypress. Whenever a Turk of respectability buries one of his family, he plants a young cypress at the head of the grave, as well because its aromatic resin qualifies the putrid effluvia of the place, as because its evergreen foliage is an emblem of immortality. But the modern Greeks never so use it.

Diospyros Lotus is not described by the ancients, though it is now found everywhere along the Bosphorus, its large pinnated foliage presenting a very striking appearance. It was originally brought from between the Euxine and the Caspian Seas, and is called the *Date of Trebisonde.* It would make a good conserve.

Elæagnus Angustifolia is described by the ancient authors. It has much more the habit and appearance of a willow than an olive; the under surface of the leaf, however, is hoary, and sometimes resembles a plating of silver. It is constantly sold in the markets. It yields a dry, mealy, saccharine substance, which is pleasant.

Rhamnus Zizyphus is a tree which has excited great controversy among botanists. What is certain, however is, that it is the tree which produces the fruit sold in abundance in the markets of Constantinople, under the name of Hunnáb agághi, and which has, for a long time, been imported into the west of Europe, under the name of *jujube.* The Turks of Constantinople plant it before their coffee-houses, with other trees, to enjoy the fruit and shade in their seasons.

Rhamnus Paliurus is the common thorn of the hedges in Asia, and forms a fence of the most impassable kind. It is covered with spines which stand in pairs, and when the smallest part of a person's dress becomes entangled, the whole is soon seized, and it is impossible to get extricated without great laceration. Dr. Walsh is disposed to think that this is the real *Christ's Thorn*, rather than that called the *Spini Christi.* The seeds are sold in the herb shops, and the native doctors prescribe them in many complaints. They are also used as a dye.

Melia Azederacht appears not to have been known to the ancients, though it is now very abundant. It is always planted in the area of a monastery, and the Greek monks form its ribbed seeds into beads; hence it is called the *bead-tree.* The white pulpy exterior of the seeds is said to be highly poisonous. The seeds are never eaten by birds. It is, however, a beautiful tree, with large compound pinnate foliage, and rich spikes of lilac flowers.

Acacia Julibrisin is an exceedingly beautiful tree, and by far the largest of all the genus. Though one mechanically sensitive when touched, it is highly susceptible of the variations of the atmosphere. The pinnate foliage affords a thick shade on a bright day; but when the rain impends, or even a cloud passes over the face of the sun, the leaflets immediately close their under surfaces together, and the tree seems divested of its leaves. When the sun again appears, the leaflets resume their horizontal position, and so speedily that the motion is sometimes perceptible. The flowers are still more beautiful than the leaves. They consist of large pencils or clusters of stamens of a bright pink hue, and rich silky texture; and hence the Turks, who are very partial to it, call it the *silk rose,* and hence its specific name among botanists. It is not a native, nor described by the ancients.

Pistacia Terebinthus was well known to the ancients, who have noticed, although modern writers have not, that it bears, like the elm, follicles in which a gnat-like insect breeds, by puncturing the extremity of the leaves, which become fungous, and swell into fleshy substances, being of a strong resinous odour, full of turpentine. The trunk of the tree when perforated, yields abundantly that fine resinous oil called *Cyprus turpentine*. There is one in the British Palace Garden at Constantinople, which measures twelve feet in circumference, rises nearly as high as the top of the palace, and shades a circle of one hundred and eighty yards. Notwithstanding the size of these trees, they are sometimes parasitical.

Pistacia Lentiscus was known by the ancients. It yields a pure transparent gum, which the Turkish women are passionately fond of chewing, to preserve their teeth, and improve their breath. The island of Scio is the place where it is at present cultivated.

Smilax Aspera, and *Smilax Excelsa*.—The smilax is so minutely described by the ancients, that it cannot be mistaken. It abounds in all the woods and hills on both sides of the Bosphorus, and the roots of both species are used in decoctions, like sarsaparilla, for which they are sometimes substituted. The S. smilax excelsa climbs to the tops of the highest trees, and descending in streaming branches, form a lofty green wall on the road side, covered with a profusion of rich red berries in autumn.

Euonymus Europæus Var.—This variety of a common tree is distinguished by the aril of the seed, which is of rich scarlet. When the pod opens, this becomes so conspicuous and remarkable, as to give it a character quite different from the common euonymus of the country.

Hedera Chrysocarpa is a rare plant. Theophrastus describes two species of ivy, white and black. Diosorides and Pliny describe a yellow kind called *dionysia and poetica*, because it was that with which bacchants and poets were always crowned, and *chrysocarpa*, from the golden colour of the berries. It is still sold in the herb shops of Constantinople, and used medicinally.

Prunus Ceranus; two Varieties. The first is a cherry of enormous size. It is cultivated in gardens always as a standard and by a graft. The second variety is an amber-coloured transparent cherry, of a delicious flavour. It grows in the woods in the interior of Asia Minor, and attains a gigantic size. They often grow to the height of a hundred feet, and are loaded with fruit.

Platanus Orientalis is planted by the Turks on the birth of a son. There is one in the court of the seraglio, the trunk of which is fifty feet in circumference. There is one on the Bosphorus, which measures forty-five yards; it now consists of fourteen large trees, growing in a circle from the same root, separating at some distance from the ground.

Ricinus Communis.—The seeds of this tree are taken like pills, and are so violent in their operation, as to have obtained for it the name of the *infernal fig*. It grows in great luxuriance at Gibraltar.

Cistus Crispus, C. Creticus, C. Salvifolius, are three shrubs that cover all the hills in the islands of the Archipelago and sea of Marmora. They are gummiferous. They are all distinguished by the *hypocistus*, a succulent parasitic of a rich red colour.

Poterium Spinosum is everywhere found with the abovenamed cisti, and covers the hills like furze in England.

Vitex Agnus-castus is a fragrant and beautiful shrub found on the banks of all the rivers of Greece and Asia Minor in company with the *Nerium Oleander*. It was called by the ancients *Agnus*, because it was always carried by the priestesses in the feast of Ceres. There is a certain veneration still paid to it.

Quercus Ægilops, Q. Coccifera, Q. Pubescens.—The first of these produces a large cup, which are exported to Europe for dyeing, under the name of *valonia*. The second abounds in the islands of the Archipelago, and on the hills in the Bosphorus. The third is a beautiful tree; the leaves are covered with down, and the branches, when young, are pendulous like willows.

Pinus Maritima, P. Pinea, clothe the islands in the sea of Marmora. The cones of the latter are sold in the markets. When exposed to the fire they open, and are as large as hazel nuts, and are eaten in the same manner.

Lavendula Stachas is with difficulty cultivated in a garden. This fragrant and beautiful lavandula covers the hills in the islands of the Archipelago, and the sea of Marmora.

Ruscus Racemosus is found in the islands of the Archipelago. Dr. Walsh thinks this is the Alexandrian Laurel of Dioscorides.

Kœbrenteria Paniculata was found by Dr. Walsh, growing about ten miles from Smyrna in a garden. This garden is supposed to be that which Sherrard the botanist had formed.

Of the esculents, herbaceous, annual plants, &c. mentioned by Dr. Walsh, we select the following:—

Erigeron Graveolens was used, according to Pliny, against the bite of serpents. At present it is used against the bite of all manner of vermin, which its strong odour repels. It grows in large patches in the islands of the sea of Marmora, and flowers in autumn.

Pancratium Maritimum is justly called by Dioscorides, All-excelling. Forskal found it in great abundance in Palestine, and supposes it was the lily of the Scriptures. It is progagated by seeds as well as bulbs. Dr. Walsh found it among the ruins of Teos, and thinks it was the lily of Anacreon.

Arum Dracunculus was found in the plains of Brusa, though Dr. Walsh is not sure of its being the species called *Dracunculus*. The flower attained to the height of four feet, the spatha edged with purple, and the stem variegated like tortoise shell.

Phytolacca Decandra seems to have been introduced from America along with Tobacco. It grows now in all humid situations about the Bosphorus. The berries yield a rich purple juice, which is used with Sherbet sugar.

Cyperus Esculentus is sold in the markets. It is eaten raw, or made into a kind of conserve. The tuberous knots of the root are the parts used.

Momordica Elaterium was known, as respects its properties, to the ancients. The name elaterium, according to Pliny, was given it, from the powers the capsule posesses of ejecting its seeds, even to the danger of the eyes of the bystander. The mechanism by which this is effected is totally different from that by which the *impatiens, cardamine,* and other plants eject their seed, which they do merely by the elasticity of the valves of the capsule causing the parts to separate; but the capsule of the elaterium is a tube, without valves, from which the seeds seem to be projected in a way similar to that from an air-gun, viz. the expansion of some elastic fluid within the tube. It grows in abundance about Constantinople, and is there used, as in England, medicinally.

Solanum Egyptiacum, S. Sodomeum, S. Melongena are now abundant in the East, though they do not seem to have been known to the ancients. The first of them bears a bright scarlet fruit, which is used in soups. The second has a large rich dark purple fruit, that looks very inviting, but it sometimes gangrenes without losing its external show, while the interior becomes merely a dry powder. Hence it is called the apple of Sodom. The third bears a long black fruit, of which there are several varieties. It is seldom in great abundance, and is used in soups.

Brassica Gongylodes, B. Eruca.—The former has a protuberant swelling of the stem whence the leaves issue, and this is the only part used. The second is a fœtid, offensive plant, but preferred both by Greeks and Turks to any other salad.

Hibiscus Esculentus is very ornamental as a flower, but it is cultivated for its fruit. The unripe pod is stewed with sauce. It is also dried for use, and preserved on strings.

Onopordum Elatum is a fine thistle that adorns all the hills about Constantinople; it is also ornamental to a garden.

Papaver Somniferum.—The people in the opium harvest make an incision round the capsule, from whence exudes a milky juice, which, on the following evening, becomes black and inspissated, and is scraped off with a crooked knife.

Cicer Arietinum, *C. Lens.*—The first is used in great quantities in Constantinople with all their dishes. The second is not so abundant.

Phaseolus Nanus, *P. Chonda*, are also abundantly used. They are called by the Turks *white beans*, to distinguish them from scarlet runners.

Dolichos Lablab is cultivated in all the gardens.

Ipomæa Purpurea, *I. Villosa*, *I. Coccinea*, grow in Constantinople, with great luxuriance and beauty, turning round pales and climbing trees.

Amaranthus Hybridus, *A. Caudatus.*—The first is a native, the second an exotic. They both attain to a great size, altogether unknown in England.

Cucurbita Lagenaria, *C. Claviformis*, are varieties of the same gourd; the first resembling exactly a bottle, the second a club, which sometimes attains the length of six or seven feet. Dr. Walsh imagines this to have been the real gourd of Jonas. They grow rapidly when well watered, and wither immediately when left dry. In a few weeks they form dense, shady arbours, under which the people sit and smoke. When the fruit is young, it hangs down inside the arbour, like candles, and in this state it is used.

Cucurbita Cidariformis.—The production of this gourd, as given by the ancients, is curious. A gourd was planted in the vicinity of a quince, and it immediately adopted its form, in addition to its own. It resembled, in fact, a large quince laid on the top of a flat melon. It is called Turk's Turban, which it resembles in shape and colours. It is rare, and is used in soups.

Cucurbita Aurantia, *C. Pyriformis*, exactly resemble the fruit after which they are named, the orange, and the pear.

Cucurbita Potino is most in use in Constantinople. There are two kinds; one long and orange-coloured; the other round and white.

Cucurbita Evadghi Cavac is by far the largest gourd. It is quite white, resembling a huge snowball. It is in season in winter. Dr. Walsh does not know the species, but has given it the Turkish name.

Cucurbita Citrullus is the famous water melon, so highly prized all over the East. It is the great luxury of the common people in Constantinople. It is in form a perfect sphere, and intensely cold.

Cucumis Melo, several varieties.—There is one variety so very delicate that the seeds given to Dr. Walsh were sealed up in a bottle, not to be opened till they were about to be sown. The following directions were stated as to its cultivation. In the beginning of May, the seeds are thrown into water; those that float are thrown away, and those that sink are suffered to remain twelve hours. The ground is chosen rich, and manured with pigeons' dung. A small cavity is made, in which several seeds are sown together. When they come up, three or four only of the most vigorous plants are allowed to remain. The fruit ripens in August, and is so rich that no sugar or other seasoning is ever used with it.

Other kinds of melon are cultivated about Constantinople, and most of them sold in the markets. They generally bring about the rate of a penny per pound.

CAITHNESS.

CAITHNESS is sometimes called the shire of Wick. It is the most northern county of Scotland, and is bounded on the north by the Pentland Frith, which separates it from the islands of Orkney; on the east and south-east by the Moray Frith: on the south and south-west by Sutherlandshire; and on the west by the northern Ocean. Its form is an irregular triangle, containing about 690 square miles. The coast is rocky and indented with a number of bays; it is particularly remarkable for a number of bold headlands. The principal of these are Landside-head on the west; Holburn-head, Dunnet-head, Duncansby-head, Noss-head, and Clythness. Dunnet-head is the most northerly land on the mainland. Near Duncansbay-head lies John O'Groat's, commonly said to be the most northern point; but it is two miles farther south than Dunnet-head.

The western part of the county is hilly and even mountainous, therefore chiefly adapted for the rearing of sheep; but towards the east, it is almost level, and watered with several small lakes and rivers. This part of Caithness is without any shelter from the piercing winds coming from the sea.

The climate is very cold generally, yet variable, and very wet. More rain falls here than in almost any other place on the eastern coast of Scotland, and for the most part in spring and autumn. The longest day in summer is about eighteen hours, and the sun makes at that period so small an arch below the horizon, that the inhabitants enjoy a continued twilight from his setting till his rising.

The soil of this country varies from black and clay loam to light sandy, in general yielding abundant crops of oats and beans, of which great quantities are exported. In point of fertility indeed, it is equal to most parts of the kingdom, in proportion to the depth of the soil. Owing to its wet seasons, wheat husbandry does not prosper: but various kinds of green crops are cultivated with success. The improvements that have been made in Caithness during the last half century have indeed been great, which is not to be wondered at, when it is recollected that Sir John Sinclair, who lately died, was an extensive proprietor in it, exerted himself in an especial manner to the encouragement of its agriculture. The wretched system of service, customs, and tithes exacted formerly by the landlord from the tenant is now abolished, and the rent of the land paid in grain or money. According to Sir John Sinclair's view of the agriculture of Caithness, in 1794, only 93,600 acres could be accounted productive land, including not only that which was in tillage, but also such pastures as were supposed cultivatable. But now many of the waste lands have been brought under crop, and the miserable fences of turf which separated the waste lands from the arable, have given way to stone dykes. Considerable improvements have also been made in the pasture farms, by the substitution of sheep for small Highland cattle, which has greatly increased the value of property.

Great numbers of black cattle are however still reared for home use and sale. Many thousands were annually sent south, but of late years the demand has been dull. A curious kind of traffic has existed from time immemorial between the Caithness and Orkney people. Annually a number of colts, one or two years old, are sent into the islands, which return a proportionate number of horses, from five to eight years old.

There are few trees in the county, but experience has shown that they would thrive if proper care were employed to protect them when young. The trunks of large trees are often found in the mosses, which here abound, and which yield the chief part of the fuel used by the inhabitants. Coals, principally from England, are also now much in use. The attempts to find native coal have been unsuccessful. The subsoil, however, although it generally consists of clay upon clay slate rocks, in some places presents, whinstone and sand stone. An inferior kind of lime-stone is also found, and shell marl is to be met with, in great abundance. There are also traces of various metallic minerals.

Hares, rabbits, grouse, heath-cocks, partridges, snipes, plover, and all kinds of game, are in great plenty throughout Caithness; also swans, wild geese, sea-ducks, wood-cocks, and birds called *snow fleets*, about the size of a sparrow, which are exceedingly fat and delicious. These last always take their departure in April, remaining only during winter. Prodigious quantities of sea-fowl hatch in some of the headland rocks, furnishing many of the inhabitants with food. The rivers and lakes afford trout, salmon, and eels, and the sea abundance of cod, haddocks, and other kinds of fish. The herring fishery has of late years been very prosperous. Wick is the principal station. There have on an average been caught 100,000 barrels annually. The quantity caught at other stations may amount to 40,000 or 50,000 more. Great numbers of seals are killed in the caverns that open into the sea. These caverns are narrow at the mouth, but in the inside lofty and spacious, and run some hundred yards under ground. The seal hunters enter them in small boats, and lighting torches as soon as they land, with loud shouts they alarm the animals, which they kill with clubs in attempting to pass.

The chief manufactures in Caithness are linen yarn and leather. The condition of the cultivators of the ground has of late years materially improved. Among the hills they speak Gaelic; in the other parts, the English language is in current use. The names of many of their places are evidently Norwegian. The antiquities of the county consist of old castles and Picts' cairns. The former are nearly all on the coast, and on bold projecting points; the latter are scattered over the face of the country, generally on the slopes of rising grounds.

The money judiciously appropriated by government from the price of the forfeited estates has been expended in the Highlands in making roads and bridges, to the great and growing improvement of this county as well as the others. The recesses of the north have thus been opened up, so that the mail-coach now travels where the Highland pony, twenty-five years ago, could only make his way. Valuable tracts of land have thus been, and will continue to be brought into a state of cultivation. The impulse has thereby also been given to local measures of improvement of the same character. Indeed the proprietors and tenants of Caithness have some time ago procured an act of parliament for assessing themselves for the price of making 180 miles of roads. The spirit that has thus already manifested itself, will increase, and, as the inhabitants will uniformly find, to their advantage.

The population of Caithness in 1811, was 23,419; in 1821, it was 30,238, and in 1831, it was 34,500. It sends one representative to parliament.

WILLATS' FLORIST CULTIVATOR.

This volume contains, truly, a great many plain and practical directions for the management of the principal florist flowers, shrubs, and trees adapted to the flower-garden, shrubbery, and greenhouse. Besides a long described selection of plants, there are select lists of a number of the finest kinds, which with a Botanical as well as an English index of familiar names, render the volume singularly intelligible and comprehensive. The described selection contains no fewer than six hundred and sixty-three plants.

From the undescribed and select lists we give that of dahlias, with the prices and appended directions for their management:—

" *A List of the Last New Dahlias*:—

Ariel, 5s.
Augusta, 2s.
Alicia, 5s.
Aglaia, 7s. 6d.
Blanda Perfecta, 2s. 6d.
Beauty of Sheffield, 5s.
Criterion, 5s.
Countess of Chichester, 2s. 6d.
Donna Maria, edged, 2s. 6d.
Duke of Gordon, 7s. 6d.
Elphinstone's New painted Lady, 3s. 6d.
Elphinstone's Polyphemus, 7s. 6d.
Elphinstone's Commander, 3s.
Enchantress, 2s.
Excelsa, 2s. 6d.
Fanny Kemble, 5s.
Fair Helen, 2s.
Golden Yellow, 2s.
Globe Crimson, 2s. 6d.
Granta 5s.
Hermione, 7s. 6d.
Jaune Insurmountable, 2s.
King of the Whites, 2s. 6d.
—— of the Orange, 2s.
Livick's Incomparable, 2s. 6d.
—— Commander-in-Chief, 2s. 6d.
—— Lord Milton, 2s. 6d.
Lady Fordwich, 5s.
—— Ripon, 7s. 6d.
—— Fitzharris, 1s. 6d.
Lord Stanley, 2s.
Maid of St. Leonard's, 2s.
Metropolitan Blush, 5s.
—— Perfection, 5s.
—— Queen, 2s. 6d.
—— Calypso, 5s.
Melinda, 7s. 6d.
Negro Boy, 1s. 6d.
Paper White, 2s.
Picta Formosissima, 1s. 6d.
Paronica, 2s. 6d.
Queen Bess, 1s. 6d.
—— of Whites, 2s.
—— of Yellow, 1s. 6d.
—— of Dahlias, 5s.
Rubre Compacta, 7s. 6d.
Seale's Invincible, 1s. 6d.
Springfield's Rival, 3s. 6d.
Widnall's Perfection, 2s.

" *Directions for the Management of Dahlias.*—A hotbed should be prepared about the 25th of March, and fine-sifted sandy soil should be spread over it to the depth of four inches, the roots put on, and the tubers covered with similar soil, being cautious to leave the crown of the root uncovered.

" The plants should be secured from frost, and the shoots, being advanced in growth to about three inches in length, may be detached by means of a sharp knife, cutting through the shoot immediately under the joint, nearest the crown of the root. The shoots should be put into pots of sandy loam, plunged up to the rim, and covered with a glass, and shaded from the sun. Guard them from worms and insects by ashes or lime siftings, as they are great enemies to these plants. If a hotbed cannot be obtained, place the roots in a warm south aspect in May, and secure them by a hand-glass, guarding them from the mid-day sun.

" If they are sufficiently rooted, they may be planted out the beginning of June.

" The soil should be a good rich sandy loam.

" The caterpillars and earwigs must be watched every day, as they are particularly fond of them.

" Take up the roots in November, of a dry day, but expose them to the open air, protecting them from frosts of nights. When they are dry, and freed from the greater part of the mould, either tie each root in dry moss or straw, or cover them with dry sand or bran, placing them where they are to remain during the winter, perfectly secured from frosts and damps."

There are pretty full directions for the management of the flower garden, shrubbery, and greenhouse, for every month of the year, which are evidently the result of much experience. As an example, take—

"THE FLOWER GARDEN AND SHRUBBERY.

"*March.*

" The beginning of this month make a moderate hotbed, to receive the seeds of the *less tender Annuals*, such as Africans, French Marygolds, &c.

" Shelter choice flowers from frost, too much wet or cold winds, but especially snow, as that frequently rots the plants sooner than any thing.

" Give a little fresh earth to herbaceous plants in pots.

" Sow a full crop of hardy annuals the beginning of this month, as also the seeds of *biennials*, such as sweet williams, &c.

" If not done last month, plant all *hardy perennials*, such as rockets, &c.; but let this work be done early in the month—if not, the blooms will be weak.

" Finish planting *box* and *thrift* for edgings.

" If the choice *carnations* and *pinks* were not potted last month, it ought not to be deferred longer. A good rich loam is the best for *them*.

" Finish planting all *flowering shrubs* the beginning of this month, and give each plant a watering, to settle the roots in the earth.

" Now is a good time to clip the *box-edgings*, and to turn and rake the gravel walks, as this will materially check the growth of weeds.

" The cuttings and slips of hardy plants may now be planted.

" Sow this month the seeds of *perennials*. As soon as strong enough, prick them out in beds of good earth, to get strong enough to plant out for good in the autumn.

" Slip and plant offsets of auriculas.

" Sow *carnation* and *pink* seed this month.

" *Evergreens*, such as *laurels*, *laurestinus*, &c. may now be planted; but give them water when you first plant them, and occasionally afterwards, if the weather should prove dry.

“ Lay *roses*, laurels, and laurestinus this month.

“ Stake all tall standard trees, to secure them from the wind.

“ Sow seeds of *fir*, *pine*, *bays*, *cypress*, *arbutus*, &c. Sow sweet briar seed, and hawthorn for hedges.

“ Plant *climbers* to run over fences or walls.

“ The annuals sown last month in the hotbed should be pricked into another.

“ *Auriculas* should now be removed to the stand where they are to blow, and some flat oyster shells should be laid on the surface, to save too frequent waterings.

“ Attend now to the weeding of the borders, as the weeds will begin to show themselves.

“ *Mignonette* sown last month should be transplanted; and if plunged into the hotbed, the plants would strike much sooner. Prick out *biennials* and *perennials* sown last month. If any ranunculuses or anemonies are planted now, they will blow in the middle of May, but much weaker than those planted in October; but this mode keeps up a succession.

“ Watch the birds narrowly, as they will be very busy in eating the young shoots of carnations, pinks, &c. particularly the sparrows and chaffinches.

“ THE GREENHOUSE.

“ *March*.

“ Sow the seeds of geranium, &c. and put them into the hotbed.

“ Now give the plants plenty of air, and frequent light waterings.

“ Fresh earth the pots, and shift your plants where necessary.

“ It will greatly refresh the plants to give them a sprinkling with the rose on the pot.

“ Now is the time to head down myrtles, &c.

“ Whenever you shift any plants, you should always put, besides the oyster shells, a little drift sand at the bottom of the pots.

“ Plant cuttings of *myrtles*, *geraniums*, &c. and put them into the hotbed.

“ Sow *orange* and *lemon* kernels, and put them into the hotbeds.

The windows of the greenhouse should be shut for half an hour after the plants are watered. Ten or eleven o'clock is the best time to water them, and when the sun shines is preferable.

“ You may now give succulent plants a little water, but very sparingly.”

As a suitable addendum to the calendar, the shrubs and flowers which usually blow in each month of the year are enumerated.

“ *March*.

“ *Shrubs in Flower*.

“ Almonds
Cornelian Cherry
Larches
Laurustinus
Laurel
Mezereons
Portugal Laurel
Scarlet Maple
Sea Buckthorn
Spurge Laurel
Traveller's Joy

Flowers in Bloom.

Anemones (single)
Alyssums
Auriculas
Colchicums
Crocuses
Crown Imperials
Cyclamens
Daffodils
Daisies
Dog's Tooth Violet
Fritillaries
Heartsease
Hepaticas
Hyacinths
Lungwort
Narcissus
Persian Irises
Periwinkles
Pilewort
Primroses
Polyanthuses
Star Flower
Snowdrops
Tulips (early)
Turban Ranunculus
Violets
Wallflowers
And several of last month.

Forced Flowers.

Carnations
Honeysuckles
Jonquils
Lilacs
Lily of the Valley
Pinks
Polyanthus-Narcissus
Roses
Tulips
Violets.”

We can only afford room now for certain general observations, which all cultivators of flowers and shrubs would do well to study. Indeed, the idea which has particularly been suggested by this little volume is, that any one, without any other guide whatever, may very soon and easily become a superior florist, and upon a scale of variety and extensiveness which few practise.

“ Whenever roses or any other shrubs are infested with blights, take sulphur and tobacco dust in equal proportions, and strew it over the trees in the morning, when the dew is on; and when the insects disappear then wash the tree with a decoction of elder leaves.

“ Whenever you want to raise any plants from cuttings (except those that are perfectly hardy) let there be a mixture of drift sand in the mould, as this will assist their striking, always remembering that a band-glass put over them will be more likely to ensure success. They should be shaded from the mid-day sun; but the mat should be removed when the sun is off, as they should have plenty of light.

“ To draw off any imperfect spots in pinks or carnations, put a small glass on the flower-stick, which will remove them in a few days.

“ Before you plant ranunculuses, the roots should be laid on a damp flannel to swell; and shake over the bulbs a little dry sand, before they are covered with the mould.

“ If greenhouse plants are in a room, and the weather is very severe, set a pail of water near them at night, or burning two or three rushlights will often preserve them from frost.

“ Double colchicums and crocuses should remain in the ground two years.

“ Old pink roots best to save seed from.

“ To drive away ants, use sulphur steeped in water; and if they or worms infest gravel walks, strew the walks over with salt, and then water them.

“ *To Destroy Snails*.—Place tiles about the garden, in a hollow direction. They will get under them in the night, and in the morning you may destroy them.

“ Remove rose trees in February, to make them blow late; or cut some of the buds off, which will answer the same purpose.

“ To preserve the choice bulbs, cover them over, in severe weather, with old tan, or coal ashes.

“ When flowers are withering in a flower-pot, plunge about one-third of the stems into boiling water, and by the time the water is cold they will revive; then cut off the ends and put them into cold water with a little nitre, and they will keep fresh for several days.

“ Sow all seeds shallow; and if they are small, such as poppies, Venus' looking-glass, &c. they should be sown very thin, or the plants will not thrive.

“ Hoe and sow in the dry, and plant in the wet; this will generally ensure the crop, and what is planted out will be much more likely to grow.

“ Shrubs and flowers should never be planted deep, as they will not thrive so well.

“ Never put plants into too large pots, as they generally run to roots and stalks, but seldom blow well.

“ It is a good method to put oyster-shells round the plants in pots in summer, as they will not require so much water, and will keep the surface cool.

“ No plants (but especially tender ones) should be watered when the sun is upon them, as it often turns the leaves yellow, and injures the plants.

“ Water in the evening from the latter end of May to the latter end of August, and afterwards in the morning, as we often have frosts the beginning of September.

“ In the winter plunge pots up to the rim in tan or ashes to preserve the plants from the frosts.

“ Hardy greenhouse plants should be kept chiefly in the shade during the summer months, but never under the droppings of trees. Air is of consequence to all plants, so that they should be placed where they can have plenty of it, though not so exposed as to be injured by high winds.

"If you wish for roses at Christmas, select from your rose trees such buds as are just ready to blow; tie a piece of thread round the stalk of each. You must take care not to touch the bud with your hand, or even the stalk any more than you can avoid. Cut it carefully from the tree, with the stalk two or three inches in length. Melt some sealing-wax, and quickly apply it to the end of the stalk. The wax should be only as warm as to be ductile. Form a piece of paper into a cone-like shape, wherein place the rose; screw it up carefully, so as to exclude the air from it; do so by each; then put them all into a box, and the box into a drawer, all which is intended to keep them from the air. On Christmas day, or any other day in winter, take them out, cut off the end of the stalks, place them in a flower-pot with lukewarm water. In two or three hours they will blow as in the summer, retaining all their grateful fragrance.

"Whenever you want to transplant any flower roots in the summer season, make it a rule to do it in the cool of the evening, and give them all a little water; if this plan is not adopted, the sun will spoil them.

"To destroy earwigs, place the bowls of tobacco pipes on the tops of the flower-sticks, and you will find them in the morning in the bowl; turn them into a basin of water, and put the bowls on the sticks again.

"*A Substitute for Bog Earth.*—Take a quantity of earth from a common about a foot deep with the turf; mix this with rotten dung, part horse and part cow, with a portion of mould from a hollow tree, and a portion of drift sand; let the materials be well mixed together, and lay for several months before it is used, turning it once a week for a fortnight.

"The best soil for carnations and pinks is a large proportion of a good rich loam, mixed well with an old melon bed, a little cow dung, and a small portion of drift sand.

"*Soil proper for Pink Pipings.*—Take one barrowful of light rich mould; add to it half of one of light loam, with half of one of drift sand. When you plant the pipings, sprinkle some water over them, and in an hour afterwards put the hand-glass over them, which must remain on till they are struck, shading them from the mid-day sun. They must always be watered over the glass with the rose on, so that the water should go entirely round the glass.

"When the sun is off take the mat away, as they should have plenty of light."

LOBELIA FULGENS.

There are three beautiful species of this plant; the *lobelia cardinalis*, the *lobelia splendens*, but above all, the *lobelia fulgens*, of the culture of which some account is now to be given, from a paper on the subject, by Joseph Sabine, Esq., describing the singularly successful practice of Mr. Hedges, gardener to the Earl of Mansfield, at Caenwood.

Most of the lobelias are American plants, and grow by the sides of rivers, with habits very much resembling our *epilobium palustre*. The lobelia fulgens was introduced from Mexico in 1810, and treated as a frame plant; it produced flower stems, from two to three feet in height; but it was reserved for the skill of Mr. Hedges, to discover a mode of culture under which this beautiful exotic has assumed a character of magnificence which makes it one of the most conspicuous decorations of our flower gardens.

The following is Mr. Hedges' practice. In October, he takes off the suckers which are thrown up from the roots of old plants, and puts them in small pots, one in each pot, and keeps them in a cold frame till the middle of January; he then removes them into a cucumber frame, where the heat is kept up to 65 degrees of Fahrenheit's scale, by linings of hot dung; a pine succession stove of the same temperature will equally suit them. In the middle of February, they are shifted into pots a size larger; and at the end of March, or in the beginning of April, they are again moved into larger pots, and in the middle of May, they are a third time shifted; the pots to be used for this last shifting, are those called by gardeners *twelves*. As soon as the plants are rooted, after the last removal, they are carried into a peach-house, or greenhouse, in which they continue till they flower, and are hardy enough to bear the open air. When they are preparing to throw up their flowering stems, and during their growth, it is necessary that they be kept very moist, which is effected by putting pans under the pots, and keeping the pans constantly filled with water. The plants, thus managed, begin to flower early in July, and the spikes continue to blow, and are covered with flowers through the autumn. The compost used in the pots is formed of equal parts of brown or yellow loam, and of leaf or bog mould, to which is added sand, equal to one-fourth of the previous composition, the whole being well mixed together.

The following dimensions were taken from a plant in the garden at Caenwood: the base of the stem six inches in circumference; height of the centre spike five feet and a half; the shoots from the bottom and sides of the main stem, seventeen in number, rising together round the principal stem, about four feet and a half high. Frequently Mr. Hedges' plants are much taller, and sometimes shorter, with a more bushy appearance, which is produced by stopping the centre stem, after the last shifting.

HOW MOSSES MAY BE USED

IN THE CULTIVATION OF CERTAIN PLANTS.

Several species of exotic plants grow well in common flower-pots, or indeed any vessel, whether round or square, very compact and close, or porous and open, when filled with moss. Mosses may thus be used with much advantage, especially for plants which require large pots and much moisture. The *canna indica*, *canna patens*, *datura arborea*, *agapanthus umbellatus*, *hydrangea hortensis*, *eucomis punctata*, *eucomis striata*, *calla Æthiopica*, *eranthemum pulchellum*, with several others, most readily send forth roots in mosses or *hypnums*. Cuttings of the *hydrangea* readily strike root in the moss, and soon form flowering plants.

The yellow crocus grows and blows well in pots filled with moss; and some other bulbs would, perhaps, also succeed.

Of the advantages in using moss in pots, with respect to plants that will thrive in such a substance, several may be mentioned. Ornamental plants when so grown, are much better adapted for being placed in sitting-rooms. Plants may much more safely be sent to any distance in moss without pots, than in earth and pots; the roots penetrating the moss, and forming balls, which retain moisture for a long time. When moss is used, draining needs little to be thought of.

Those mosses that grow in plantations should be preferred, because many bits of rotten spray and decayed foliage mingle with them, and form a desirable addition. Pull up the moss with its roots; or if the place of growth admit, cut it up with an inch of the surface vegetable mould adhering to it; or the moss wetted, may be rolled among vegetable earth, which will adhere to it. Some plants grow well in the pure moss; but many more will succeed in moss mixed more or less with such earth.

Hypnum moss, it has been thought, possesses a power to some extent of regulating temperature, more than most kinds of earth; that is, it resists extreme heat and extreme cold, and is not apt to lose all moisture suddenly, while it discharges a superfluity readily. It becomes also gradually richer by decay, when a supply may be easily added.

ON FURZE.

Furze, whin, or gorze is a well known indigenous plant, and to those who have allowed it without interruption to pollute their grounds, it is generally looked upon with great dislike. Not so Linnæus, who is said, when he first beheld it in blossom in this country, to have fallen upon his knees and offered up a prayer of thanksgiving to the great Author of Nature. It will grow in any dry light soil, the better the land the more luxuriant; and may be propagated by seed sown in any of the spring months; for let those who have never looked upon this plant but as a nuisance, remember that it possesses superior and profitable qualities as an article of food for cattle, &c. Dr. Anderson successfully adopted the following plan with it for this useful purpose.

A field of good dry loamy land being well prepared, he sowed along with a crop of barley the seeds of the furze, in the same way as clover is usually sown, allowing at the rate of from fifteen to thirty pounds of seed to the acre. The seeds if harrowed in and rolled into the barley, quickly spring up and advance under the shelter of the other crop during summer, and then keep alive of themselves during winter. Next season, if the field has not a great tendency to run to grass so as to choke them, they advance rapidly after midsummer, so as to produce a pretty full crop before winter. This may be cut with a scythe immediately after the clover crop fails, and may be continued to be cut during the whole of winter as occasion requires. By some it is supposed to get out of date after February, but Dr. Anderson cannot say so, not having at any time had a sufficiency to serve beyond the end of February. He has, however, often seen horses beating the whins with their hoofs, so as to bruise the prickles, and then eat them even in the months of April and May; and sheep which have been used to whins, pick off the blossoms, and the young pods at that season, and probably the prickles also. As to sheep, which he says take to this food very fondly when once accustomed to it, less nicety is required in the culture of whins than that recommended for cattle or horses; for if the seeds be simply sown broad-cast, very thin (about a pound per acre) upon the poorest soil, after they come up, the sheep of themselves will crop the plants. Sheep, he says, will even crop bushes of whins, by nibbling off the young prickles one by one, very quickly, so as not to be hurt by them, although sheep that have not been used to this kind of browsing do not know how to proceed, and often will not taste them; but a few that have had practice will soon teach all the rest.

As a green food for cattle, the shoots should not be more than two years old, and they then require to be passed between rollers to bruise the ligneous parts and the prickles. In this way the plant is a highly nutritious food for horses and cattle. Horses eat it as readily as hay. It should, however, be used soon after being bruised. Two bushels, it has been said, if given with a proper allowance of hay, have been found sufficient for a day for three horses performing the same labour as with corn. Cows fed upon it yield nearly as much milk as while upon grass, which is free from any bad taste. We have heard of a decoction made of whins and used to advantage along with dry substances.

For fences and for firing whins are sometimes used, but their chief value does not lay in these ways.

ON THE CULTURE OF THE HAWTHORN.

The whitethorn or hawthorn is one of our best hedge plants. It will grow in almost any soil, though of course the rapidity of its growth will much depend on the nature of the ground in which it is planted. It is propagated by seed, which ripens in October. As the seeds are collected, they should be allowed to remain in sacks, but not too many of them together. Carry them as they are collected to the nursery; spread them out not more than ten inches thick, mixed with any light dry sandy soil; while in this situation, great care must be taken that on the *rot ground*, they do not ferment too much; turning over once or twice will prevent this injurious process, as well as hasten the decay of the pulpy matter which covers the seeds. They should remain in this situation at least one year. It is to be borne in mind that the hawthorn's seed, like that of the ash, mountain ash, and some others, do not vegetate the first season after being gathered. Some of the hawthorn seeds will commence showing life about eighteen months after being gathered; therefore it is a good time to sow them in February or March.

The seed-beds should be light, and moderately rich. The ground should be well dug, and deeply and finely raked, as a portion of the surface must be pushed off with the back of a rake before the seeds are sown. If the seed is good it should lay at the rate of each being about one fourth of an inch from another. If the seeds will allow, next draw a roller of about sixty pounds weight over the bed; the roller to be exactly the breadth of it, which will prevent the seeds from being displaced when the earth is drawn on again. If the seeds be too moist to allow of the roller, the back of a spade will beat them in.

Sowing in drills is a better way, as affording to the plants a freer circulation of air; and this method should be pursued as the ground is dug, to save treading the dry soil, allowing eighteen inches or two feet between the drills, each drill being about nine inches broad.

When the seeds have been one year sown, the strongest plants should be drawn from the bed, to be transplanted into nursery beds or lines. Great tenderness is required in taking up these plants, so as neither to hurt their roots nor the seeds which may not yet have vegetated, or the small plants that require to stand another year. The bed should be first loosed carefully with a fork; and, after the selected plants are removed, the beds must not be left so as the drought may get to the roots of those that remain. Those taken up, if planted again in beds, should be four inches apart, where they may continue for one season; but if in lines they may remain for two, by which time the most forward will be fit for the hedge.

WASH FOR FRUIT TREES.

In the fifth volume of the "London Horticultural Transactions," the following *wash* for fruit trees is described as having been employed with great success by Mr. Braddick. The principal ingredient is the water through which the coal-gas is passed for the purpose of purifying it. Its extremely fœtid smell led him to think that no insect could resist its influence, and in this he found that he had not been deceived. He mixes one pound of flower of brimstone in three gallons of gas water, and adds soft soap enough to make it adhere to the buds and branches when laid on with a painter's brush. The composition may be mixed over fire with safety, as it is not inflammable. It does no injury to trees. Mr. Braddick has tried it fairly, under glass, on the most delicate of all trees (the flat peach of China) without damage.

WEEDS.

One year's good weeding,
Will prevent seeding;
But one year's seeding,
Makes seven years' weeding.

ON GRASS TURF IN FORWARDING THE GROWTH OF CERTAIN VEGETABLES.

Grass Turf, it is well-known, is highly conducive, whether in a more or less decayed state, to the growth and health of plants. This suggested to Mr. Bisset, gardener at Methwin Castle, some years ago, that turf might be employed upon a new principle with advantage, for promoting the early production of certain vegetables; and in the "Memoirs of the Caledonian Horticultural Society," we find an account, to the following effect, of his procedure and success.

Early Pease.—For the purpose of forwarding early pease he secured a quantity of well matted grass turf previous to winter, so as to be supplied without fail about the middle or end of

January. He cuts the turf in pieces of about nine or ten inches broad, and a foot or fifteen inches long, to be afterwards reduced in size. The tops of flues, and the borders of forcing houses, he appropriates for the reception of these turfs, having the pease sown in them; or framing pots of any description may be used. The application of bottom heat will be found necessary, particularly if the winter be severe; and in order to effect this, so as not to produce an over-heat, he employs a mixture of stable-litter and tree leaves, such as may have been previously used in the forcing of sea-kale or asparagus. Frost is thus kept out, and germination promoted.

The beds being prepared, a quantity of the turf is then cut into pieces of about nine or ten inches long, and five or six broad. These are placed in a regular manner over the beds, grass-side downwards. If the turf be from inferior land, add a little rich loam to the soil thereof, forming at the same time a shallow drill along the middle of each row of turf. A row of pease is then sown in a regular manner in each drill, and afterwards slightly covered with rich loam.

While the pease advance in growth, it is clear, that their roots will take possession of the turf; and the turfs and growing pease may be lifted together and removed to a south border where the crop is to be produced, without the plants sustaining the least injury in transplanting. By the beginning or middle of March the pea plants on the turf will be five or six inches high, and will therefore, on account of the smallness of the space betwixt the rows, require to be wholly or partially removed to the south border. In general every alternate row may be removed and the remainder allowed to advance till they begin to show their flowers, when these may also be safely removed to the place where they are to yield their produce. The plants last removed will afford the first crop, and therefore a succession of young pease may thus be obtained. It is necessary, however, to protect the peas from frost, immediately after being put out, especially if they are near the flowering state; for this purpose, beech and spruce branches, or straw-ropes, may be employed with good effect. Young pease may be thus had in abundance throughout Scotland in the end of May or early in June. A good early sort however must be selected.

Early Potatoes.—A similar procedure is adopted with regard to early potatoes. The difference which is particularly observed is this:—The turf is cut into pieces about three or four inches square. These are placed in a close irregular manner over the beds, and only one tuber or cutting planted in each piece. This should be done about the middle of February; and by the time the potato plants have reached three or four inches in height it is necessary to remove them to a sheltered south border, where the crop is to be produced. The application of bottom heat in the case of potatoes is essential, and if a part of the plants be left in the pits, in such a manner as if they had been planted there, new potatoes may be had occasionally after the middle of April, whilst a succession will be afforded by the middle or towards the end of May.

Beans.—A similar treatment may be applied for forwarding early crops of common beans, and French beans, particularly the latter. But three or four seeds should be planted in each piece of turf, and the proper season for planting, according to the nature of the crop, must be observed.

Early Cauliflower.—Turf upon the same principle may be advantageously employed for this plant. With the exception of the cauliflower being planted in the turf, the treatment is in every respect the same as that which is generally adopted in the north for preserving cauliflower plants during the winter. A compound of grass and surface soil is peculiarly conducive to the health of this vegetable; and according to the method here recommended, the plants in the following spring may be allowed to remain under glass till they attain to a large size, and yet may be removed to the open border without risk, since they are completely established in the turf, which is moved along with them.

Strawberries.—Here also the same principles are applicable, by the observance of which the use of pots may be dispensed with. At the proper season for planting strawberries let a piece of ground be formed into beds about four feet wide, and a quantity of turf, about five or six inches square, placed in a regular manner over the surface. A quantity of fresh loam, richly manured, should be added to the surface of the turf previous to planting. To furnish large stools, let four or five plants be put separately into each piece. This is done to best advantage early in spring, with plants taken from runners of the preceding year; or in the end of summer, with that summer's runners. If due attention be paid to watering in dry weather, the plants will grow vigorously, so that by the end of the autumn season their roots will be fully established in the turf, and they may be removed to the forcing pit with nearly as little injury as if they had been in pots. The plants must be planted in a ball of earth, or decayed compost, prepared in the forcing pit appropriated for that purpose.

The *roseberry* kind of strawberry suits the turf cultivation admirably; for though not the earliest, nor best in flavour, it invariably yields a plentiful crop, even the first year after planting, which renders it a most appropriate strawberry for being forced. All kinds, however, that are capable of being forced in pots, may be done so in turf; for if it be taken from a stiff soil, it will last for two years, and at the end of that period it will still be found to possess adhesive qualities.

The employment of turf will also be found of importance in the management of the flower garden, in the case of showy annuals of a half-hardy character, or with the more tender kinds of stocks, wall-flowers, &c., by sowing or transplanting them at the proper season, and keeping them under shelter during the winter, to be removed and planted in the following spring, in the flower borders.

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Lardner's Cabinet Cyclopædia, Vol. LXXV.—Descriptive and Physiological Botany. By the Rev. J. S. Henslow, M. A., Professor of Botany in the University of Cambridge.

This concise and comprehensive treatise, although especially intended for the general reader, will meet the taste and the acquirements of the scientific botanist. It presents not merely a condensed systematic view of the various departments of the science, put into as popular language as the limits of the volume can possibly admit of, but the author has very frequently brought his own original speculations to bear upon the doctrines discussed, so as to confer upon the work the character and value of something much better than a compilation. His method is, of itself, evidence enough that a master-hand has produced it. He considers botany as a science embracing every inquiry which can be made into the various phenomena connected or belonging to the vegetable kingdom; and that this inquiry extends as well to the outward forms and conditions in which plants, whether recent or fossil, are met with, as to the examination of the various functions which they perform whilst in the living state, and to the laws by which their distinction on the earth's surface is regulated. He arranges all these several phenomena under two heads—the Descriptive and the Physiological. The subordinate departments under the former of these great heads are the Glossology of Botany, or mere register of technical terms—the Organography, containing a particular account of the several parts or organs of which plants are composed; the Phytography, in which a full description of plants themselves is given; and, lastly, the Taxonomy, in which plants are classified in a methodical manner, according to some one or other of the various methods which serve to facilitate our knowledge of the forms and relations of the numerous species already discovered. The Organography of plants chiefly engages the author under the first head of his division. Then, under the second head—Physiological Botany—he enters with considerable fullness into details, as this subject possesses a singular interest, owing to the numerous and striking phenomena, of practical and economical importance, which it enables him to explain. We shall now present a few examples of the manner in which the learned professor gives his details, confining ourselves to the physiological department. Of the irritability of plants:—

"Besides the excitability of vegetable life there are certain striking phenomena exhibited by some plants, which seem to indicate the presence of a property analogous to that of animal 'irritability.' A closer examination, however, of the circumstances under which this 'vegetable irritability' manifests itself, rather inclines us to believe with De Candolle, until sufficient proof be brought to show the contrary, that these are only extreme cases of the operation of the property of excitability. The sudden inclination of the stamens in the berberry towards the pistil, when the filaments are touched near the base on the inside, the well-known phenomena exhibited by the sensitive-plant, and several other singular movements of particular organs in some other plants, are the phenomena which have led to the conclusion, that some few vegetables are endowed with an irritability analogous to that which exists in all animals. But on the other hand it has been observed, that in animals this property is confined to the muscular fibre, whilst in vegetables there does not appear to be any particular tissue to which it is peculiarly restricted. In animals, again, the effects of irritability are apparent during the whole course of their life, and are not destroyed by repetition of the experiments by which they are elicited; whereas this property can be traced only under peculiar conditions of vegetable existence, and then only in certain organs of a very few species. Several of these instances, also, are only special modifications of certain actions, which are constantly produced by the operation of more general causes. For instance, the folding of the leaflets of the sensitive-plant, which takes place when we touch them, is the very same sort of effect which we daily witness in a vast number of other plants, where it is elicited by the agency of light, only in a more gradual and imperceptible manner. In these latter cases, the effect is denominated the sleep of plants, and may be more especially witnessed in the leguminose tribes, whose leaves remain folded during a certain portion of the day, and assume an appearance of langour and inaction singularly analogous to the periodical state of repose exhibited in the animal kingdom. In cases, therefore, where similar effects are brought about by the action of certain stimuli, in a yet more violent and rapid succession, we may imagine that they are nevertheless the results of the same vital property, which is here exhibited under some peculiar degree of excitement.

"*Examples of Vegetable Irritability.*—As some of the phenomena exhibited by vegetable irritability are very striking, we shall here insert a brief notice of a few of the most interesting examples.

"1. *Sensitive-Plants.*—There are several species of sensitive-plants, which possess the property of moving their leaves when they are touched, or otherwise stimulated. The most common is an annual (Mimosa pudica), with compound digitate leaves, with four pinnules; each partial petiole being furnished with numerous pairs of leaflets, expanded horizontally. One of the most striking means of eliciting the phenomenon in qustion, is by scorching a single leaflet in a candle, or by concentrating the sun's rays upon it with a lens. This leaflet will immediately move, together with the one opposite to it, both bringing their upper surfaces into contact, and at the same time inclining forwards, or towards the extremity of the partial petiole on which they are seated. Other pairs of leaflets, nearest to the one first stimulated, will then close in succession in a similar manner; and at length the partial petioles themselves fold together, by inclining upwards and forwards. Last of all, the influence is transmitted to the common petiole, which bends downwards with its extremity towards the ground, in a direction the reverse of those which were taken in the former case. The effect is next continued to the other leaves nearest to the one first stimulated, and they fold their leaflets and depress their petioles in a similar manner. When the plant is shaken, all the leaflets close simultaneously, and the petioles droop together; but if the agitation be long continued, the plant will at length become accustomed to the shock, and after a lapse of some time, the leaflets expand again. The mechanism by which these movements are produced resides in thickened or swollen joints, seated at the bottom of each leaflet and petiole; for if the upper part of these swellings are cut away, the leaf remains erect; but if the lower part is removed it continues depressed. Hence it appears that the elevation and depression of the leaf is owing to the elasticity of the tissue of which the swollen joint is composed; and that the stimulus employed to produce motion tends to weaken the upper parts of these joints in the case of the leaflets and partial petioles, but the lower part of those belonging to the main petioles—the contrary sides continuing elastic, as before. But how the effect is produced, and what may be the law which regulates its action, is not known. The causes are active from the earliest stages of the plant's existence; the cotyledons themselves exhibiting the property so soon as they have expanded. The transmission of the stimulus from one leaf to another along the stem of the plant, has been shown by Dutrochet to take place through the intervention of the ducts contained in the woody parts. For, if both the pith and the cortical portions are removed, the effects are not stopped; whilst, if the woody parts are abstracted, which contain the ducts, they cease entirely.

"2. *Desmodium gyrans.*—The Desmodium gyrans is another plant of the same natural order as the sensitive-plants, the motion of whose leaflets is still more striking than in the latter; for here the motion is continued, without the necessity of applying any external stimulus. The leaves are composed of a pair of small leaflets, and a terminal one of larger dimensions. The motion consists of a succession of little jerks, produced at intervals of a few seconds. One of the two lateral leaflets is gradually elevated, whilst the other is depressed; and when both have attained the maximum amount of movement in one direction, they begin to proceed in the opposite. At the same time the terminal leaflet becomes inclined by similar interrupted movements; first on one side, and then on the other."

He farther instances the *common berbery*, *Dionæa Muscipula*, or Venus's Flytrap, and certain species of the *Droseræ* or *Sundews*.

The author treats his readers with many most curious and important discussions, under Function of Nutrition; which he divides into seven distinct periods. We take a paragraph from the first period.

"*Absorption.*—That plants absorb moisture from the soil in which they grow admits of easy proof. The extremities of the fibres in which their roots terminate, are not covered with an epidermis like the rest of the surface, and consequently the cellular texture is there exposed, and constitutes the 'spongiole,' or true absorbing organ. As plants do not possess the power of locomotion, it is essential that their food should be so universally distributed that they may run no risk of perishing from want of a constant supply. It is further requisite that their food should be offered them in a fluid form; for it is an established principle in vegetable physiology, that the spongioles are incapable of absorbing any matter in a solid state. Whatever, therefore, is to be received into the system for the purpose of nutrition must be held in a state of solution in water. The three most important ingredients to be found among the products of vegetation, are oxygen, hydrogen, and carbon; the two former are the elements of water, and the third is an element of carbonic acid, a gas which is everywhere present in the atmosphere, and which may be detected in almost all springs and other waters on the surface of the earth. Water, again, in a state of suspension in the air, is also present everywhere. Plants, therefore, receive a constant supply of these three elements wherever they are placed on the surface of the earth, in situations adapted to their growth. Besides the three elementary substances, oxygen, hydrogen, and carbon, essential to the composition of all organized matter, whether animal or vegetable, there are other elements to be met with in slight proportion in some vegetables. Azote is an element more especially essential to the formation of animal substances; but it seems probable, that it is also a fundamental ingredient in certain vegetable compounds, in which it exists in considerable abundance. As this gas also forms a component part of the atmosphere, plants may as readily be furnished with it, as with either of the other three ingredients universally essential to their nature. Whether the other elements occasionally found in plants ever constitute an essential part of their structure, is uncertain. Several of them exist under combinations, such as common salt for example, which appear to be useful to some plants; possibly as a stimulus necessary for the preservation of their health, since they languish and die when wholly removed from their influence. In all cases, however, whatever be the nature of the various saline, earthy, metallic, and other compounds found in small quantities in the ashes of plants, they must have been introduced in a state of solution through the spongioles."

He does not allow that the cause of this action is satisfactorily ascertained.

Our next extract treats of the results of vegetable respiration.

"From what has been said it seems necesssary to conclude that carbon, in order to be fixed in vegetation, must be presented to a plant in the form of carbonic acid; and that the decomposition of this gas by the direct operation of the vital principle furnishes the first step towards the organization of brute matter.

"The ultimate effects of vegetable respiration being the reverse of those which result from the analogous function in animals, have been often regarded as a remarkable provision against the gradual deterioration of our atmosphere. But the effects produced by the respiration of animals, by combustion, and by various other processes by which carbonic acid is added to the atmosphere, are of too trifling a description to enable us to appreciate their consequences under the lapse of many ages. The continued spontaneous decomposition of a large portion of dead vegetable matter, is also perpetually counteracting some portion of the beneficial effects which the fixation of carbon by plants might produce. Still it is evident that every particle of carbon in living vegetables, and likewise all that exists in those fossil bodies, coal, jet, &c. which are the altered remains of primæval vegetation, must have resulted from the decomposition of carbonic acid whose oxygen has been set free during the process of vegetable respiration. To this we may also add whatever carbon is found in animals, since this has been derived from their food primarily obtained from the vegetable kingdom. We should possess something like a measure of the extent to which vegetation has been active in altering the state of our atmosphere, if we could obtain an estimate of how much oxygen would be required to convert into carbonic acid all the carbon now fixed in organzed beings, recent and fossil; and hence we might ascertain whether the atmosphere thus modified would still be fitted for our respiration or not. But in other respects there can be no doubt of the important results to which the respiration of vegetables gives rise. It is this process which prepares the organizable materials from whose subsequent elaboration are derived those infinitely varied conditions of organized matter which are essential to the development of the numerous tribes of plants which gladden the fair face of nature, and serve to nourish the myriads of animated beings which people the earth, the ocean, and the atmosphere. And lastly and most incomprehensibly, from these same materials are constructed those organized substances which seem to stand as portals to the intellectual and spiritual world—channels of direct communcation by which reason and revelation may tell the frail tenant of a few mouldering atoms, of that more glorious condition which will as certainly be their heritage hereafter as their hopes and yearnings after immortality are within the actual experience of their present state."

Human ingenuity and perseverance have been strikingly exemplified in detecting the progression of sap, and the local circulations in plants and trees.

"Although the proper juice appears to descend more especially by the bark and those portions of the tree which are towards the surface, and which are in fact the parts where the vitality of the trunk resides, there still appears to be a very general diffusion of the nutritious juice continually taking place throughout all parts of the tree, sometimes in one direction and sometimes in another. This may be shown by a contrivance of M. Biot. A wooden wedge boiled in wax and oil to render it impervious to moisture, has a groove cut in the upper part, and is then driven into a cavity which it exactly fits in the trunk of a tree; a space is hollowed out both above and below this wedge; the roof of the cavity above it shelves towards the middle, so that the descending sap collects there and drops into the open extremity of a pipe placed in a groove to receive it. The ascending sap rises into the lower cavity which is also cut into a groove, and it is there received into another pipe placed in the bottom. In this manner, a flow of sap is obtained either simultaneously from both pipes, or at separate times and in different proportions according to the state of the atmosphere, season of the year, and other circumstances which influence the flow. It is observed that the descending current is generally denser and more saccharine than the ascending, although the reverse is occasionally the case after violent rains. Light appears to be the principal agent in modifying the conditions of the flow. Mild weather promotes the ascent, and a sudden cold succeeding causes a rapid descent by contracting the trunk of the tree. If the cold continue and the ground become frozen, the sap is again forced to ascend. When a thaw succeeds a frost, the exhausted roots are to be replenished, and the downward current is restablished. The rapid ascent which commences in spring, when the buds are beginning to burst, ceases as soon as the leaves are completely expanded. After midsummer, the power of the solar rays being less energetic, and the deposition of earthy particles having obstructed the vessels of the leaf, less sap is exhaled from them, and the tree attains a state of plethory, indicated by an increasing flow at the upper tube of the instrument.

"It was in the year 1820, that a distinguished naturalist, M. Schultes, first announced his discovery of a peculiar movement in the juices of plants, which more nearly resembles the circulation of the blood in animals, than any thing which had formerly been observed. The existence of such a circulation had been strongly suspected before; but as the experiments upon which his actual detection of the phenomenon depended, were difficult to verify, his account was much disputed until recently, when he obtained the prize which the Academy of Sciences at Paris had proposed for the purpose of eliciting further investigations on the subject. His memoir has not, hitherto, we believe, made its appearance; but the committee appointed to examine its merits have made a favourable report of its contents, published in the 'Archives de Botanique' for 1833; and from this and a former paper in the 'Annales des Sciences,' we have gleaned the following particulars:—The liquid, whose movement is described, and which M. Schultes terms the 'latex,' is sometimes transparent and colourless, but in many cases opaque, and either milk-white, yellow, red, orange, or brown. The colours depend upon the presence of innumerable minute globules which are constantly agitated as if by a spontaneous motion, and appear to be alternately attracted and repelled by each other. This liquid is considered to be the proper juice of the plant, secreted from the crude sap in the intercellular passages, and consequently analogous to the blood of animals, as was long since suggested by Grew, who further likened the lymphatic or crude sap to their chyle. It is contained in delicate transparent membranous tubes, which become cylindrical when isolated, but when packed together in bundles assume a polygonal shape. In young shoots it is difficult to detect them, on account of their extreme transparency and tenuity; but they may be extracted with considerable facility from older parts. They have been observed very generally in Monocotyledons and in Dycotyledons, excepting in the few species in which no tracheæ have been hitherto noticed. They frequently intercommunicate or anastomose by means of lateral branches, and sometimes form a regular network. They occur in the woody fibre, in the bark, occasionally even in the pith, and very frequently surround the tracheæ. They exist in greatest complexity in the root, from whence they proceed in parallel lines up the stem into the leaves and flowers and then return again to the root, the ascending and descending branches anastomosing throughout their course. The movement of the latex can be witnessed only in those parts which happen to be very transparent; and it has not been actually seen in many plants. The *Ficus elastica*, *Chelidonium majus*, and *Alisma plantago*, are the species upon which most of the observations hitherto recorded have been made. Distinct currents are observed traversing the vital vessels, and passing through the lateral connecting tubes or branches into the principal channels. These currents follow no one determinate course, but are very inconstant in their direction—some proceeding up and others down, some to the right and others to the left; the motion occasionally stopping suddenly, and then recommencing. In detached fragments of the plant it will continue from five minutes to half an hour, according to circumstances; but M. Schultes has been able so to adjust his lens as to witness the flow in the growing plant. The action is suddenly checked by cold, and again recommences with an elevation of temperature. The effect does not seem to depend upon a contractile power of the tubes, because the latex flows chiefly or entirely from one end of a tube even when it has an orifice open at both extremities. The appearance is very similar to the circulation of the blood in the fœtus contained in a bird's egg before the heart is formed; but is more especially analogous to the circulation of some of the lowest tribes of animals, as in the Diplozoon paradoxum which may be divided into two parts and the blood still continue to circulate for three or four hours in each. By a strong electric shock, the force by which the latex is propelled is paralysed, and its motion arrested."

Strangers to the science of botany, would never dream that such interesting wonders and discoveries belong to this department of nature. While students and adepts in the study, will scarcely conceive, before recurring to this volume, that so much that is clearly and engagingly stated, could have been thrown into it, on the subject in question. Had we space for a few paragraphs which we had marked under the Function of Reproduction, the scientific, as well as the general reader, would find not less interesting and able discussions on physiological Botany. Professor Henslow's Treatise is one of the most satisfactory of Dr. Lardner's Cyclopædia.

PRACTICAL OBSERVATIONS

ON THE STUDY OF BOTANY.

The science which teaches us to distinguish one plant from another is almost of infinite extent. To know every plant which grows on the face of the earth is impossible for any one man; to know those that are natives of our own country, with all those which have been introduced into our gardens from foreign parts, would be too much for one person. Still botany may be satisfactorily studied either scientifically or practically, and into these two classes its students may be divided. The theoretic botanist is one who is well acquainted with the several parts which compose a plant, knows the names by which each part is distinguished, and can assign to them their various uses. He is versed in the history of the science, and the various systems that have been published for facilitating a study, which unless pursued systematically, little progress could be made in it, on account of the amazing diversity of objects which it embraces. All this he may acquire chiefly from books, and while sitting in his study.

The practical botanist, on the other hand, is capable of naming a plant at sight, though he may be unacquainted with the names of the several parts which compose it, and incapable of finding it out in any systematic arrangement. But it must be evident, to form a useful and rational student of the science, these two should be united; the practical part should be engrafted on the theoretic and made to illustrate it. It is necessary, therefore, that a knowledge of some system should be acquired, as the key which will unlock the whole treasures of the vegetable kingdom, the several parts of which a plant is composed, beginning with the root, and arriving at the seed, having become previously familiar to the student. In the meanwhile the practical part must be attended to, and the manner in which this is to be done, advantageously pursued in the following manner.

It will be allowed that the plants of the student's own country demand a primary attention; therefore herbarizing excursions are necessary. Of the plants thus collected, by the assistance of the outlines of botany, the student will soon be able to make great progress and to arrange each specimen in its proper place, at length raising a systematic memorandum that will be of the greatest assistance towards future advancement in the science.

In order to attain a knowledge of the structure of the several parts of the flower and fruit, too many specimens of different kinds cannot be dissected and examined. To impress this knowledge upon the mind, it is necessary that, of the plants thus studied, specimens should be preserved, or that drawings or impressions be taken of them; otherwise no memory will be able to retain the name and the character of a plant. But by having a dried specimen, a drawing, or an impression of each, with the name affixed, a knowledge of them is impressed upon the mind, which may be refreshed at any time.

The drawing of plants requires a genius for the art, and much time, though to those who are clever at it, it is a valuable accomplishment, and a delightful occupation. The taking impressions from the plants themselves is an easier and perhaps as satisfactory a procedure, in so far as the study of botany is concerned. By this means a likeness of almost any plant may be obtained in a few minutes, which will ever after serve to give an idea of the original, and still more completely if coloured from nature, though in a rude manner. To succeed in this, procure from a letter-press printer two balls, similar to those which they make use of in printing, with this difference, that they should be covered with a white sheep-skin, such as is used for making gloves of, or spreading plasters on; or in lieu of these, two pieces of soft leather, with tow or wool tied up in them. A small quantity of printers' ink, or a mixture of ivory black, well ground with boiled linseed oil, about the size of a hazel nut, is to be put on one of the balls. The two balls are then to be dabbed together, until the ink is very thinly and evenly distributed over both surfaces.

The specimen, which ought to be distinctly expressive of the habit of the plant, and to have been the preceding day expanded and lightly pressed between the leaves of a book, is then to be placed evenly on one of the balls, and repeatedly dabbed with the other. If the plant be very large, it will be necessary to cut it into two or more pieces; the uppermost ball is then to be dabbed several times on the plant, till the fibres of the leaves and the stalk become visibly black. The plant is then to be taken off the lowermost ball, and laid on one side of a sheet of thick writing paper; the other side of the paper being laid over it, the leaves and the stalks are to be pressed and rubbed over with the palm of the hand, or ball of the thumb, pretty hard, but not so hard as to squeeze out the juices of the plant—taking particular care that the plant is not moved during the operation. Thus an impression of each side of the plant may be obtained, of which the under side, as being the most fibrous, is generally the most beautiful. Too much ink must not be applied; and those who wish that the flowers should appear distinct and perfect, should take them off the plant, expand them, and colour them on the ends of the stalk afterwards.

Many parts of plants cannot well be represented in this way, such as berries, fruit, &c. A little knowledge of drawing is therefore of great advantage, and but little is required to make a sufficient likeness for future reference.

Another mode of taking impressions is practised, and by some thought preferable to the above. Rub the paper over first with linseed oil, then smoke it over the flame of a large tallow candle, moving it to and fro, that the paper may not take fire, till it be regularly black. The leaf or plant is then to be laid on the smoked paper, pressed, and rubbed till the fibres become black; the impression is then to be taken off on white paper, as before directed. Ferns can be taken off in this manner to great advantage.

But the most common and satisfactory process is to dry and preserve the plant itself. If the necessary time and pains are bestowed, plants may thus be made to retain their form, and many of them their colours. There are various ways of drying and preserving plants; the whole art of which consists in drying them under such a degree of pressure that the leaves and flowers shall neither shrink nor be shrivelled, while the plant has as much air as is necessary to its drying of a good colour, and preventing it from turning black or mouldy.

One of the best methods is as follows: first of all, be particularly careful to select a good specimen of the plant, as that requires no more trouble than a bad one. By a good specimen is understood such a one as represents the true habit and general appearance of the plant, of its common size, in full bloom, and perfectly dry. Such being procured, lay it out between the leaves of a single sheet of paper; it is of little consequence what kind, if it is not too coarse; carefully expand every leaf and flower, but not in such a manner as to give them a stiff unnatural appearance. Next place this single sheet between the leaves of a large book, laying a weight upon it just sufficient to make the plant flat, but not to bruise it.

After remaining a day or two in this state, the single sheets containing the plants are to be taken out of the book, placed on the floor of a dry room, or exposed to the sun, and covered with dry sand about an inch thick. The weight of the sand will be sufficient to keep the plant from shrivelling, while the moisture of the plant evaporates through its interstices; and thus if the situation be dry, and more particularly if artificial heat be made use of, the plants, if not very succulent, will dry quickly, and be of a good colour.

Should this method be too troublesome, the plants may be dried between the single sheets of paper kept in the large book, if they are taken out frequently to have the air, and replaced in the same book made perfectly dry, or putting them into another. By alternately exposing them to the air, and keeping them under pressure, very good specimens may be obtained and preserved.

Too much care cannot be taken of a collection thus made, for they are exceedingly liable to suffer from damp or insects. They require, therefore, a place perfectly dry, and to be impregnated with the effluvia of camphor, and to be often looked over.

In herbarizing excursions, a tin box is necessary to put the specimens into, for preserving them until the student get home; or a small folio book, provided with strings instead of clasps, that the plants may not be bruised, is on several accounts to be preferred; for instance, each specimen, for the more readily turning to it, may be placed in the order of its being gathered. For the dissector's aid, a pen-knife, a large pin, or needle, and a small magnifying lens for the examination of minute parts, should be the student's constant companions.

ON THE CONDITION OF PLANTS.

We find plants adapted to every soil and situation. The suffocating bog, the stagnant pool, the rapid river, the immeasurable ocean, the cloud-capt mountain, the rugged rock, the sandy desert, the impenetrable wood, as well as the fertile field, have their respective plants, which will not flourish in situations of a different description. In the hot scorching climates the earth is chiefly covered with trees, shrubs, and ferns, whose roots, penetrating deep into the ground, are thereby not affected by the dryness of the surface, which would destroy grasses that particularly distinguish and beautify more temperate climates. If we go far northward, we find liverworts and mosses chiefly predominating, which are capable of sustaining the severest cold.

Attention to these circumstances, therefore, becomes of great moment in the cultivation of plants. Yet nature is not so very nice as always to require a latitude, soil, and situation precisely similar; and therefore the ingenuity and skill of man have ample scope for their exercise. Plants, for example, that belong to much colder and much warmer climates than ours, yet thrive well with us, though, generally, the nearer we approach Nature in this respect, by affording congenial situations, success in horticulture and agriculture will be commanded.

Plants growing in a warmer climate than ours, require, accordingly, if planted in the open ground, to be covered or sheltered in the winter. Hence greenhouses and stoves have been invented. But plants coming from a much colder climate, are apt also to suffer from our winters, because the weather in their native situation is not so variable as with us. Plants will live when covered with snow during a whole winter, that will not brave our snow-falls, our sudden warmths, and blighting north-easterly winds. It therefore frequently becomes necessary to secure the plants from Siberia in a green-house or common hot-bed frame, as well as those from Virginia and Carolina. Hand-glasses, close or open at top, and covered or not covered with a mat, just as circumstances point out, prove extremely useful in behalf of exotics.

Notwithstanding all the advantages of soil, situation, and shelter, plants are liable to be obstructed in their growth by a variety of causes; sometimes by diseases arising from unknown agents, sometimes from excess of cold, heat, or moisture, but most commonly from insects and other animals. Vegetables, we have reason to believe, are for the immediate support principally of the animal kingdom. We find almost every plant eaten either by its particular insect or by several sorts. Thus the oak affords sustenance to, at least, fifty different species; the willow to about thirty; while the mullein supports one species only. Some insects will feed only on one particular plant; others are by no means nice in their choice.

But there is no plant which is not liable to be thus eaten; some insects feed particularly on the root, some on the pith of the stalk, some on the leaves, some on the flower, and some on the seeds and kernels. Plants which appear to superficial observers as useless or noxious, afford sustenance to a variety of insects. Thus, three different species of butterfly feed on the stinging nettle, in their caterpillar state. Hence it becomes evident, not only that a knowledge of the soil, the climate, and the situation most congenial to the nature of a plant, is necessary, but also of insects, their habits, and the plants on which they feed.

It is very common to call almost every disease to which a plant is subjected by the sweeping name of a blight, and many absurd opinions prevail on this subject, which if checked, and were the ingenuity and observation of mankind generally directed aright, many remedies and practical results of great value might be fairly anticipated. Blights, for example, may arise from very cold north-easterly winds in the spring, when the trees and plants are in leaf, succeeding to a very mild season; or from hot sun-shining weather succeeding to long continued rains, when the foliage, being full of juices, cannot bear the sudden intense heat; but by far the most common arise from insects, especially the aphis, or plant-louse. A popular belief is, that these are brought by the east winds; but the wind has nothing to do with them.

These insects are, in their perfect state, winged and very productive. Though they do not devour the foliage, and other parts of plants, as caterpillars and many other insects do, yet, by sucking the juices, they occasion the leaves to curl up, whereby the plant is disfigured, and, if not destroyed, frequently rendered abortive. Most of the family attach themselves to the stalk, leaves, and other parts above ground; but the roots are also attacked by some of the species of the aphides.

We have merely introduced these few plain and very general observations, to keep the minds of our readers awake to the importance of having the laws of Nature ever in view, when studying how to promote improvment in any of her kingdoms.

MRS. BRAY'S BORDERS OF THE TAMAR AND THE TAVY.

THIS description of part of Devonshire, which has been published by Mr. Murray a few days ago, does the authoress great honour. Three such goodly volumes, filled with such a variety of interesting matter, proves in a striking degree how talent and industry can invest a circumscribed locality with a general importance. The plan of the work, it appears, was suggested by the Poet Laureate, to whom the Letters are inscribed. It contains something for every class of readers—antiquities, sketches of scenery, natural history, biographies, religious reflections, traditions, poetry, and romance—all treated in a manner characteristic of an elegant and spirited writer. Indeed, the beauty of an accomplished female mind is apparent in every page of the work.

In the variety of the contents of these volumes, there are many notices which suit our pages. For example, there is a copious and minute description of Dartmoor, or the Forest of Dartmoor, as it is still called in legal documents, from which we take the following passages :—

" In order to ascertain how far the conjecture is founded on probability that Wistman's Wood, on Dartmoor, is the posterity of a Druid grove, we must consider its known antiquity—its localities—the extraordinary appearance and actual state of the dwarf and venerable trees, that still flourish in decay amidst the rudest storms, and in one of the rudest spots throughout the whole of the moor ;—the probable age of these oaks, and how far one tree would be likely to succeed another;—and though last, not least, their relative situation with the other British antiquities, by which they are in fact surrounded, and that close at hand. Mr. Bray's derivation of the name of Wistman's Wood, given in the last letter, must also be borne in mind ; since this most curious antiquity in the vegetable world is very near Bairdown : so that if he is right in his derivation in both instances, the hill of Bards, and the wood of the Wisemen, or Druids, were contiguous.

" I shall now give you a short extract from a very brief entry in Mr. Bray's journal of August 9th, 1827, concerning this wood. He says as follows:—' Tradition relates that Wistman's Wood was planted by the celebrated Isabella de Fortibus, Countess of Devon[*]. But I do not hesitate to say, that, to any one who has visited the spot, it is evident no other hand has planted it than that of God. No one would or could have planted trees in the midst of such rocks[†]. They unquestionably can be no other than the remains of the original forest; which, though in its original acceptation—according to Du Cange in *V. Foresta*, it comes from *feris*, that is, *ferarum statio*, a station for wild beasts—it means but 'a wild uncultivated ground *interspersed* with wood,'[‡] must yet have had some trees, at intervals, in every part of it. At present (except here, and in some modern plantations, of which those of my father are the finest) there are none, though the trunks of trees are occasionally found in the bogs. It is not improbable that these trees were first very generally destroyed by fire, in order to extirpate the wolves. The few that remained were destroyed by cattle afterwards pastured there; and it is only, perhaps, owing to their being so surrounded and interspersed with rocks that those of the wood in question have been preserved from a similar depredation.

" ' At the late visitation at Tavistock, on the 31st of May, Archdeacon Froude, a gentleman possessed of considerable antiquarian information, told me that he had lately obtained part of a tree from this wood, with a view, if possible, to discover its age by the number of circles from its centre to the circumference ; that, by the aid of a microscope, he had counted about seven hundred; but that at times the divisions were so minute as hardly to be distinguishable ; that, different from any other trees he had ever seen, the circles were more contracted, and in a manner condensed, on one side than on any other ; and that he supposed this was the side the most exposed to the beat of the weather. On consulting Evelyn's Silva, I found the following passages in his second volume, which may throw some light upon the subject:—

" ' The trunk or bough of a tree being cut transversely plain and smooth, sheweth several circles or rings more or less orbicular, according to the external figure, in some parallel proportion, one without the other, from the centre of the wood to the inside of the bark, dividing the whole into so many circular spaces . . . . . by the largeness or smallness of the rings, the quickness or slowness of the growth of any tree may, perhaps, at certainty be estimated.' "

" ' The spaces are manifestly broader on the one side than on the other, especially the more outer, to a double proportion, or more ; the inner being near an equality.

" ' It is asserted that the larger parts of these rings are on the south and sunny side of the tree (which is very rational and probable) insomuch, that by cutting a tree transverse, and drawing a diameter through the broadest and narrowest parts of the ring, a meridian line may be described.

" ' It is commonly and very probably asserted, that a tree gains a new ring every year. In the body of a great oak in the New Forest, cut *transversely even* (where many of the trees are accounted to be some hundreds of years old), three and four hundred have been distinguished.' These and other remarks, he attributes (p. 204) to ' that learned person, the late Dr. Goddard.' For the age of trees, see Clarke's Travels, vol. vii., p. 312. 4th Edit. 8vo."

Of the plants in Devonshire :—

" During the Spring in our neighbourhood, and, I believe, in most parts of Devon, nothing can exceed the gorgeous display made by the golden blossom of our furze. It is said that when Linnæus was in England, he was more struck with the magnificent appearance of this wild furze, than with any other of our native plants. It grows most abundantly on tracts of waste land, by the side of roads, and on certain portions of Dartmoor. Near Moreton-Hampstead it is seen so thick and splendid, that it might be compared to an embroidery of gold on velvet of the richest green. I have seen this furze, when skilfully managed by a tasteful artist, introduced with good effect into foregrounds ; where, like the rich opposition of colour in the pictures of Titian, it contrasts finely with the deep and ultra-marine tints of the sky and the distant tors. Our May-blossoms, too, growing on the thorns in the hedges, are exceedingly luxuriant, and beautifully clustered. And scarcely does the yellow blossom of the furze disappear, when there comes forth, in such abundance as I have never seen in any other county, that most elegant of all wild flowers, and most delicately painted in its bell, the Digitalis, or Foxglove ; or, as the peasantry here call it, the Flop-a-dock. The height to which these plants grow in Devon is extraordinary. I have seen many hills so covered with them, that, thus viewed in combination, they have produced an effect truly magnificent ; especially where some of our noble ferns interposed to add to that variety of form and colour so essential to the picturesque. The white foxglove is an exceedingly rare plant, even here, where I have always understood botanists find so choice a field for their pursuits : it is found on Dartmoor. In Somerset and Devon, the common people use a decoction of it as a most powerful emetic; too powerful, I should think, to be taken with safety.

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[*] Among the peers of Henry the Second, was William de Fortibus, Earl of Albemarle, created Earl of Devon in right of his wife Isabel, sister and heiress to Baldwin de Redvers, or Rivers, eighth Earl of Devonshire. The title thus created in 1262, became extinct in 1270.

[†] That Wistman's Wood was *not* planted by Isabella de Fortibus is proved by the fact before noticed, that the record of a perambulation of the moor (made immediately after the Norman conquest) is still preserved in the office of the Duchy of Cornwall, by which we find Wistman's Wood was even at that remote period much the same as it now appears.

[‡] Todd's Johnson's Dict. See also there the *legal* sense of the word.

"Whortleberries are both fine and plentiful on some parts of the moor. They are delicious (somewhat resembling in flavour the American cranberry) when made into tarts, and eaten with that luxury of all luxuries, the clouted, or, as we call it, scalded cream of our delightful county. The heath-polt principally feeds on the whortleberry, that grows wild on the moors. Round the tors of the forest the finest white clover springs up spontaneously; and no doubt this, in a great degree, renders the moor so excellent in the pasture it affords the sheep.

"Though I have confessed my entire ignorance of botanical subjects, which I regret, I can tell, nevertheless. many of our wild flowers by the names that are prevalent among the peasantry. Some of these it may be as well to mention, since they are of antique date. And who would do other than look with an eye of interest on the pretty flowers that were chosen by Ophelia to form her 'fantastic garlands,' as she strayed by the 'glassy stream' under the willow that grew 'ascaunt the brook?'

> 'There on the pendent boughs her coronet weeds
> Clambering to hang, an envious sliver broke;
> When down her weedy trophies, and herself,
> Fell in the weeping brook."

"We have here 'crow-flowers, nettles, daisies, and long-purples,' and many other plants whose names are as ancient, as poetical, or as fantastic; for here, too, the 'long-purples' are called 'dead-men's fingers.' And poor Ophelia herself might have sung snatches of old tunes, as she formed garlands from flowers so wildly called as ours. We have the *maiden-hair*, a pretty pendent plant for her 'coronet;' and the *lost-love* that would have reminded her of Hamlet; and the *shepherd's calendar*, and the *one o'clock*, the very dial of poetry; and the *cuckoo-flower*, that opens its little pink buds at the time the bird from which it borrows its name does his note. And we have too, the *snap-dragon*, as varied and as beautiful as any garden flower. And the *thor-mantle*, excellent as a medicine in fevers; and the *cat's eyes*, that are as blue as ether, with a little white pupil in the centre; and *bright-eye*, with its glossy leaves; and *mother of millions* with its numerous small drooping flowers: and *honesty*, whose bells hang like open purses by the side of its stem. *Milk-maidens* are little white flowers that grow in the meadows, or on the banks of running streams. And Love supplies many with his name; for we have a plant called *seven years' love*, and *love entangled*, a wild picturesque flower that grows on the tops of old houses; and *love in a puzzle*, a delicate plant with leaves resembling in colour the wings of an early butterfly. We have also the blue *hare-bell*. The harmless nettle is here called *archangels*. And indeed we have a vast variety of others that speak in their very names the imaginative and poetic character of our forefathers in this lovely county."

There seem to be vestiges of the Druidical superstitions still existing among the Devonians:—

"We know, from ancient writers, that the British priesthood held sacred many plants, herbs, and trees. Their reverence for the all-heal, or misletoe, is too universally known to require being noticed here. But it is not a little remarkable that the common people of Dartmoor, and, indeed, throughout all this neighbourhood, hold in great reverence many herbs, which they use to cure divers diseases, accompanying their applications, even as did the Druids, with sundry mystical charms in barbarous verse. Though I had attempted to get some of the old women to repeat to me these charms, I never could succeed with them; and never should, had it not been for Mary Colling. The reason was this: the lower orders entertain an idea that if once those charms get, as they say, 'into a printed book,' all their efficacy will be for ever destroyed. The good old souls, therefore, when I questioned them (having previously taken it into their heads that all I heard would go into print) would not risk a charm in my hearing. With Mary they were less suspicious, and by her means many of their charms stand at this hour in jeopardy. Nothing can be more barbarous than the rhymes that compose them; and these are used over many of their decoctions from herbs that are really medicinal. The names by which such decoctions and herbs are known would puzzle a better botanist than I shall ever be; since who, for instance, would ever guess what was meant by *organ's tea*, an excellent potation for a cold, and here much in request? Other names equally strange could I repeat, if by any possibility I could guess what letters of the alphabet, when put together, would produce any word to express a similar pronunciation of uncouth sounds.

"I have been charmed myself, though against my will, by the good-natured assiduity of an old servant, who, when I was suffering from inflammation in the eyes, determined to cure me by one of these heathenish rites. Mr. Courtenay, of Walreddon House, in this neighbourhood, was also charmed, for the same complaint, by an old woman who exercised her skill upon him without his permission; and as he has never since been troubled with his old disorder, the cure is duly ascribed to successful magic by the vulgar.

"Divested of their superstitions, we have, indeed, in this town and neighbourhood, many useful elderly women, who act not only as charmers, but as nurses; and who, with a little more instruction, might become as serviceable as that most praiseworshy and respectable of all the religious orders of the Church of Rome—the Nuns of Charity; an order so eminently useful, that every one will join with you in wishing that some lady, who had talents and influence sufficient to carry it into effect, would lead the way for a similar order being established in this country on a Protestant foundation. To return to our good old women. The charms which they hold in such estimation are carefully handed down from one generation to another. This is done by a woman communicating the secret of these mysteries to a man, or a man to a woman, as the most likely means of preserving them in their full efficacy; now and then, however, they tell the secret to one of their own sex."

Though the authoress does not profess a knowledge of the science of botany, nor of the art of horticulture, she has a tender and pure conception of the beauties of the vegetable kingdom, and of the delights to be derived from a garden. She has besides, the power of conveying to her readers a perfect sympathy of fancy and feeling on the subject.

"Those who delight in sacred studies can never forget that a garden was the first possession bestowed on man whilst he was in a state of innocence. There, by the forfeiture of his obedience, he became subject to mortality. And in a garden, too, stood the sepulchre, whence came his assurance, by the resurrection of our Lord, of his immortality. Even the heathen world of antiquity affords us examples of how many great and wise men delighted in the culture of a particular spot of earth. The admirable Numa left with reluctance his garden and his retirement at Cures (where, says Plutarch, he gave his hours to the worship of the gods, to his friends, and dressing the ground, and feeding cattle), to become the king of Rome. Cincinnatus was taken from the plough to be a Dictator. 'And the sublime imagination of Plato,' says an eloquent modern writer, 'still required him to seek God amidst the pleasant haunts of a garden.' It is recorded of Socrates, that he delighted in the beauties of the country, where, in a garden, he enjoyed sitting under the plane-tree, on the margin of a pure stream, to breathe the evening air. In ages of a more recent date, we have numerous examples of the best men who found in a garden a relaxation from the toils, and a solace for the cares of life. Renè, the afflicted and noble Count of Anjou, felt a melancholy pleasure in showing to his friends the flowers he had reared with his own hands. Fenelon, in such a spot, would pursue his walks of contemplation 'in peace and silence before God.' In our own country, how many good men have evinced the same taste! How many great poets and writers have, like the bees around them, culled from the garden the choicest sweets, and stored them as the flowers of song! The poem by Mason, on such a subject, can never be forgotten; for he was one

> ' Of those the favour'd few, whom Heav'n has lent
> The power to seize, select, and reunite
> Her loveliest features; and of these to form
> One archetype complete of sovereign grace.' "

Few things interest the spectator more than a venerable and majestic tree, especially if it be an oak. Here is a specimen:—

"The great curiosity of Meavy is the oak, which stands just without the churchyard; it is a most noble ruin of that king of forest trees. The top is quite bald with 'dry antiquity;' but from the various branches about the centre still sprout leaves of a beautiful bright green, though when we saw them they were somewhat changed and crisped by the touch of autumn. The trunk of this mighty tree is immense in circumference, and so hollow, that it appears to be supported by scarcely anything more than the outward shell connected with the roots. This noble piece of antiquity is still imposing; it looks, indeed, an emblem of sinking majesty, and inspires feelings of veneration and awe, not unmixed with those which arise from reflecting on the vanity of years; since Time, whatever be their strength or their continuance, will at last make them, even as this tree, fall before him. There is no tradition respecting the age of the great Meavy oak; but I doubt not it witnessed the Saxon heptarchy, if not the Roman Conquest; nor is there anything extravagant in the supposition, when we recollect that in the survey of Dartmoor (still preserved in the office of the Duchy of Cornwall), and made soon after the Norman Conquest, the oaks in Wistman's Wood are described very much the same as they appear at this day."

These extracts show how much a fine imagination, and a reflecting cast of thought, can make of natural objects, which are, by the careless, passed by as common-place; and how abundant, in every corner of our land, the materials are for a judicious hand to turn into a book. Devonshire has long been celebrated for its natural charms, and imposing antiquities; but Mrs. Bray's description will extend its fame, and add to its classic character.

DESCRIPTION OF THE PLATES.

LILIUM PHILADELPHIUM.

PHILADELPHIAN LILY.

Hexandria Monogynia.

Liliaceæ.

Gen. Char.—Sepals six, campanulate, with a longitudinal line, and generally reflexed. Valves of the capsule connected by a nest of hair.

Spec. Char.—Leaves whorled. Flowers erect. Corolla campanulate. Petals clawed.

The bulbs are small, white, scaly, and produce each a single stem, somewhat more than a foot high, bearing at the summit two flowers, and clothed with a few whorls of entire lanceolate leaves.

The flowers are of a bright purple colour, marked with several dark purple spots toward the base, and appear in July, but it produces no ripe seed in this country; it is less hardy than some of the other sorts, and ought therefore to be protected in very severe winters, by covering the beds with old tan or coal ashes, to preserve them from the frost; and in the spring this covering may be removed before the bulbs shoot up.

Growing in a small compass, and the flowers having no ill smell, it is proper for the borders of small gardens, but the bulbs do not put out many offsets. The stalks decay soon after the seeds are ripe. This is the proper time to remove the roots, which do not put out new fibres till after Christmas.

DELPHINIUM STAPHISAGRIA.

STAVESACRE LARKSPUR.

Polyandria Digynia.

Ranunculaceæ.

Gen. Char.—Calyx 0. Petals five. Nectary bifid, cornute behind. Siliques 3-1.

Spec. Char.—Spur very short. Bracteoles inserted at base of pedicel. Petioles hairy. Petioles twice as long as flower.

Stem round, downy, erect, simple, one or two feet high, and of a purplish hue. Leaves hairy, composed of 5-7 oblong lobes, which have frequently one or two acute indentures on their sides, and are of a pale green colour. The flowers form an elegant open spike at the extremity of the stem, each on a short peduncle. There is no calyx. The filaments are numerous, awl-shaped, and crowned with oblong yellow anthers. Germens three, superior, styles filiform, stigmas simple. Capsules one-valved, many-seeded.

"Stavesacre is, with difficulty," says Gerard, "preserved in our cold countries; albeit in some mild winters, I have kept it covered over with a little ferne to defend it from the injury of the March wind, which doth more harm unto plants that come forth of hot countries, than doth the greatest frost." This is a sensible observation; and although Mr. Miller affirms that the stavesacre require no other treatment than the common larkspur, yet we frequently find that the plants committed to the open air, without protection in our climate, are killed in severe seasons. The seeds should be sown where the plants are to remain.

EPILOBIUM LATIFOLIUM.

ORACHE-LEAVED WILLOW-HERB.

Octandria Monogynia.

Onagrariæ.

Gen. Char.—Calyx four-cleft, tubular. Petals four. Capsule oblong, inferior. Seeds comose.

Spec. Char.—Leaves alternate and opposite, lanceolate, ovate, nearly entire, pubescent, veinless. Flowers unequal.

Stems slender, eighteen inches to two feet long, trailing upon the ground, with scarcely any rudiment of angles.

Leaves of a pale grey colour; a few near the bottom, sometimes serrated, the rest very entire, and somewhat succulent. Flowers large and showy. Petals, when first expanded, perfectly regular, afterwards more or less approximating towards the upper side. Anthers greenish red, ending in a blunt point. Pollen green. Style bending down; the divisions of the stigma incurved, spreading.

The smell of the whole herb in withering is very unpleasant. It is quite a sea-side species, is very hardy, creeping by the root; should be cultivated in a moist salt soil, without which it will hardly thrive; and increases readily both by seeds and runners.

VACCINIUM FORMOSA.

RED-TWIGGED WHORTLE-BERRY.

Octandria Monogynia.

Ericeæ.

Gen. Char.—Corolla urceolate, or campanulate, four-five cleft, with reflexed segments. Filaments inserted in the ovary. Berry four-five celled, many-seeded.

Spec. Char.—Leaves oblong, acute, serrated, smooth. Raceme aggregate, terminal, corymbose. Corolla cylindrical, with short erect segments. Style exserted.

This species of whortle-berry is a native of North America, and is consequently hardy enough to bear the severity of our common winters. The leaves are deciduous when planted in the open ground; but if kept in the greenhouse, where it will be found very ornamental, it becomes an evergreen.

It should be planted in sandy peat earth, on a dry, sheltered border; and is propagated by layers, which should be put down in spring, and taken off the succeeding summer.

GALAXIA OVATA.
OVAL-LEAVED GALAXIA.
Monadelphia Triandria.
Irideæ.

Gen. Char.—Spatha one-leaved. Calyx 0. Corolla Monopetalous, six-cleft, with a long tube. Style 1. Capsule three-celled, inferior.

Spec. Char.—Almost stemless; leaves oblong. Spatha one-valved one-flowered.

Root filiform, fixed to an ovate netted comose bulb; there are usually several of these conglomerate. Stem, none. Root leaves heaped, sheathing, ovate, obtuse, slightly veined longitudinally, flat, smooth, the edge somewhat cartilaginous. The calyx is a very thin sheath. The capsule is smooth.

This most singular looking little plant, whose beauty is but of a few hours' duration, requires the same treatment as that necessary for most Cape bulbs; light sandy peat, a little warmth when approaching to flower; and to be removed afterwards. It seeds freely.

MORÆA TRICOLOR.
THREE-COLOURED MORÆA.
Triandria Monogynia.
Irideæ.

Gen. Char.—Flower six-petalled; after flowering involute above, spirally twisted beneath, finally falling off. Capsule many-seeded.

Spec. Char.—Leaves radical, lanceolate, channelled. Flowers terminal, three-coloured.

Flower-stem round. The leaves grow from the root, and are larger than the flower-stem. Flowers with six petals, spreading; the innermost petals are more spread out and narrower. Capsule three-sided, three-flowered, three-celled, many-seeded.

This very delicate looking species of Moræa is a native of the Cape, and flowers in June or July, if planted in autumn.

The only means of seeing this plant in perfection, is by keeping it free from the air when near flowering, as it is too delicate to bear exposure. It begins to expand about twelve o'clock, and is quite decayed by three.

The best soil for this plant is a mixture of sandy loom. It requires the same treatment as other Cape bulbs.

GENTIANA SAPONARIA—Var. *a.*
SOAP-WORT, OR BARREL-FLOWERED GENTIAN.
Pentandria Digynia.
Gentianeæ.

Gen. Char.—Capsule of one cell. Corolla tubular at the base, destitute of Nectariferous pores.

Spec. Char.—Flowers in whorled heads, sessile. Corollas ten-cleft, ventricose, closed; alternate segments shorter, entire. Leaves lanceolate.

This very handsome variety of Gentian is a hardy perennial; native of North America, where it is very common in grassy places in the woods.

It requires a shady situation and a mixture of bog earth, or rotten leaves, with a loamy soil; is readily increased by seed, which only requires to be sown in pots soon after it is ripe, and the pots placed in a shady situation and kept free from weeds; and in the following spring the plants transplanted into borders, where they are intended to remain.

DAHLIA—Var. *a.*
HOPKIN'S BEAUTY OF NEWINGTON.
Syngenesia Polygamia Superflua.
Compositæ.

Gen. Char.—Receptacle paleaceous. Pappus 0. Involucrum double: outer many-leaved, inner one-leaved; many-parted.

For an opportunity of figuring this beautiful variety we are indebted to Mr. Hopkins, of Newington, one of the most successful cultivators of this pleasing genus.

The treatment of the dahlia bears a considerable resemblance to that of the potato and the marvel of Peru; as soon as the frost has blackened the top of these plants, their roots require to be taken up, and kept in a dry place, where the frost cannot get at them, till spring. About April they may be divided, and planted in the open air where they are to flower; or what is more common, planted in pots, and forwarded in heat till the middle of May, when they may be turned out of the pots, where they are finally to remain. In this case they will flower a month or six weeks earlier than by the other method, and will, in general, continue flowering till they are destroyed by frost.

Some care is requisite to preserve the roots sufficiently moist and plump to maintain the living principle, and yet not to rot, shrivel, or frieze them. The safest mode is to plant them in pots or boxes of dry earth and placed in a shed or cellar, or under an ample covering of litter, thatched over.

CHIRONIA LINOIDES.
FLAX-LEAVED CHIRONIA.
Pentandria Monogynia.
Gentianeæ.

Gen. Char.—Capsule ovate. Seeds numerous, small. Calyx five-parted, erect. Corolla equal, with a five-parted limb of equal segments. Filaments from the mouth of tube. Anthers after bursting spiral. Style declinate.

Spec. Char.—Leaves linear, erect. Branches fastigiate. Peduncles elongated.

An under shrub, with filiform, round, smooth branches. Leaves opposite, acute, an inch or more in length, succulent. Flowers scarlet, solitary at the ends of the branches, pedunculated. Tube of corolla half five-cleft and obtuse. It is a very neat pretty greenhouse plant, occupying but little room, and enlivening the collection by its blossoms, plentifully produced during most of the year, and especially at the close of summer; it requires to be frequently renewed, which is easily done, as it strikes readily from cuttings; it requires also more warmth in the winter than most greenhouse plants; and as it is apt to go off in cold moist seasons, it will be prudent to keep a pot or two of it on the front shelf of the stove during such unfavourable weather.

MAHERNIA ODORATA.
SWEET MAHERNIA.
Pentandria Pentagynia.
Byttnerniaceæ.

Gen. Char.—Calyx nearly naked, campanulate, five-fid. Petals five. Styles five, cohering in one. Capsule five-celled, five-valved, many-seeded.

Spec. Char.—Leaves lanceolate, smooth, serrated at end.

The mahernia odorata is from the Cape of Good Hope; and the flavour of the blossoms is exactly that of the *tonquil.* It continues to produce its brilliant yellow flowers through the whole year. It is a greenhouse plant, and must be raised every two years at least from cuttings; which should be made about the beginning of March, and placed on a gentle hot-bed; they will by this means become good sized plants by midsummer.

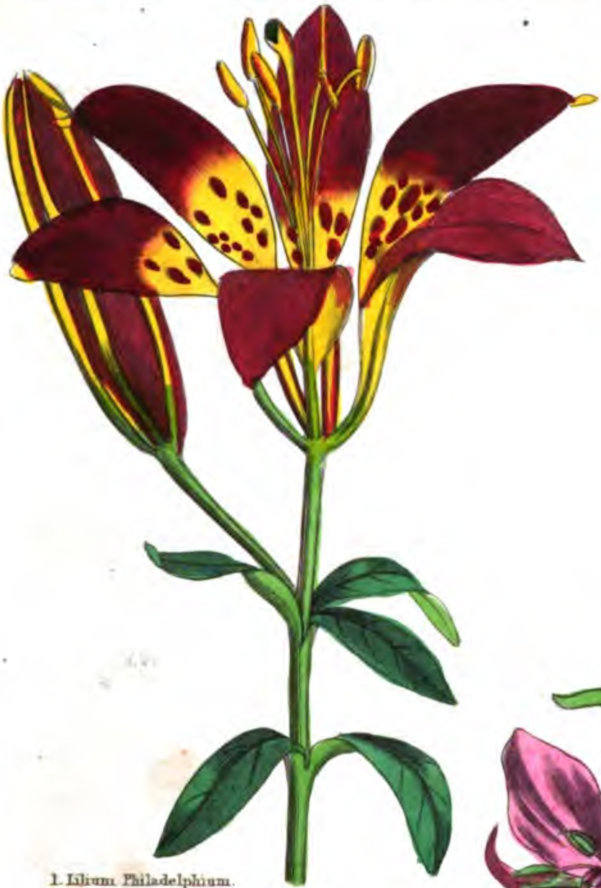
GLADIOLUS NANA.
DWARF GLADIOLUS.
Triandria Monogynia.
Irideæ.

Gen. Char.—Spatha two-valved. Flower tubular, with a six-parted irregular limb. Stamens ascending. Stigmas three. Seeds winged.

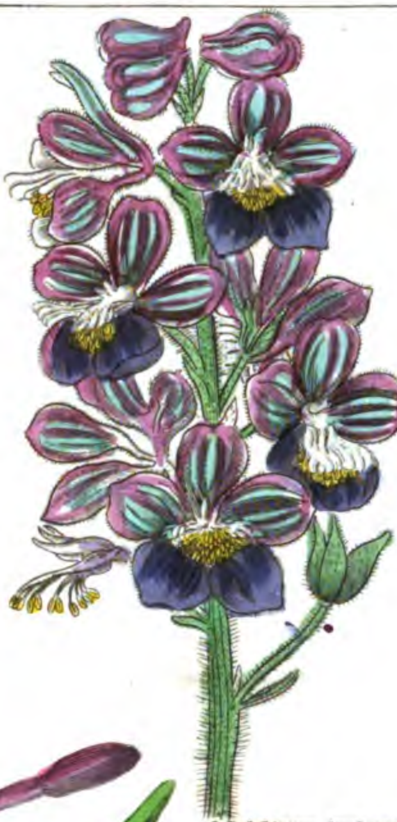
Spec. Char.—Leaves lanceolate-hairy.

The flower stem is quite covered with flowers, the length of the leaves; blossom gaping, the segments very long, spreading different ways and waved. Sheath three-valved.

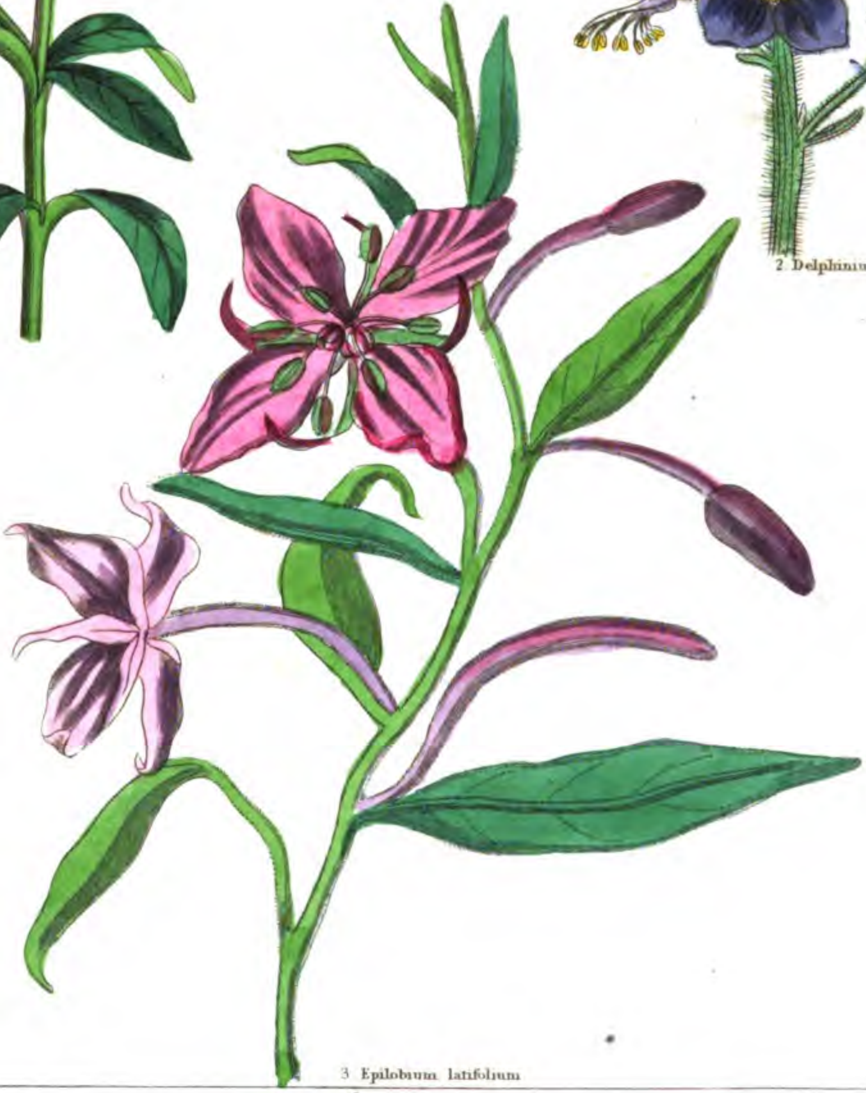
This extraordinarly handsome Gladiolus is a native of the Cape of Good Hope, and should be kept during the winter months in more heat than is required for the generality of Cape bulbs; and is readily increased by offsets, which should be planted in sandy peat loam.



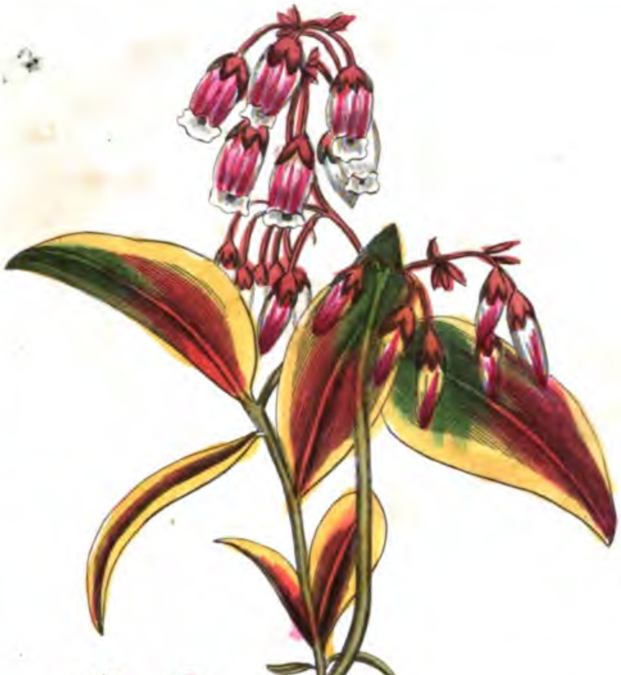
1. Lilium Philadelphium.



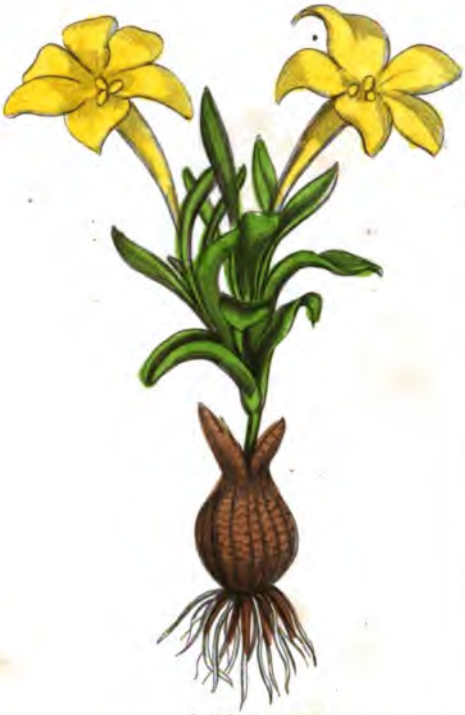
2. Delphinium Staphisagria.



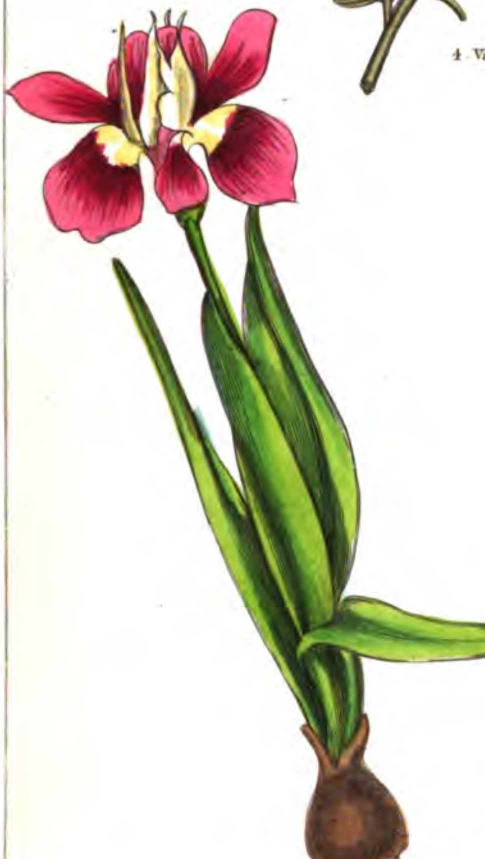
3 Epilobium latifolium



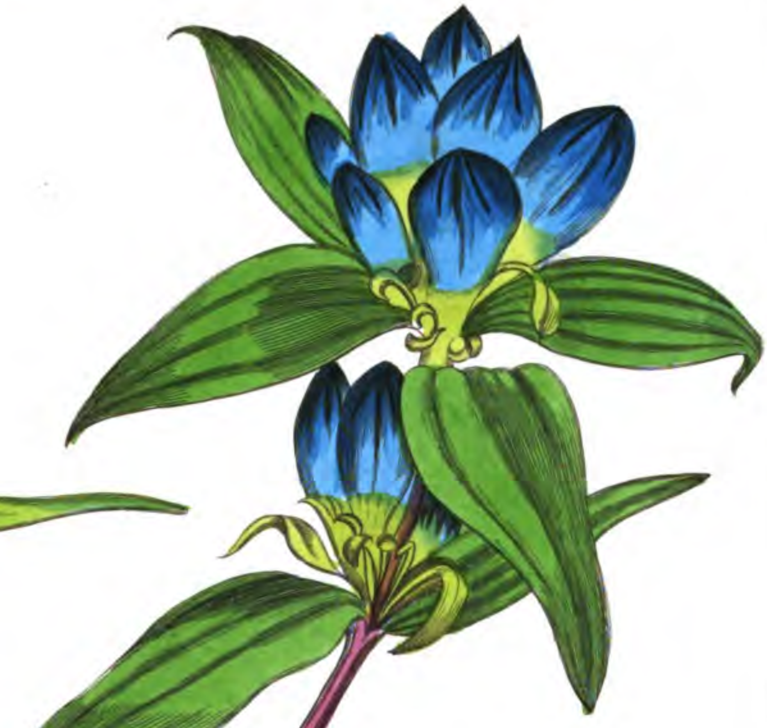
4. Vaccinium formosum.



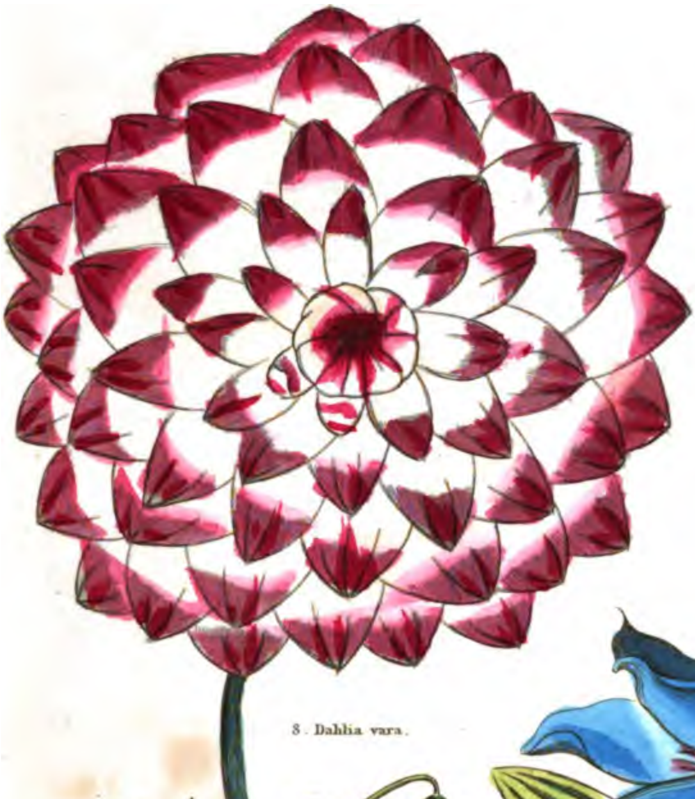
5. Galaxia ovata.



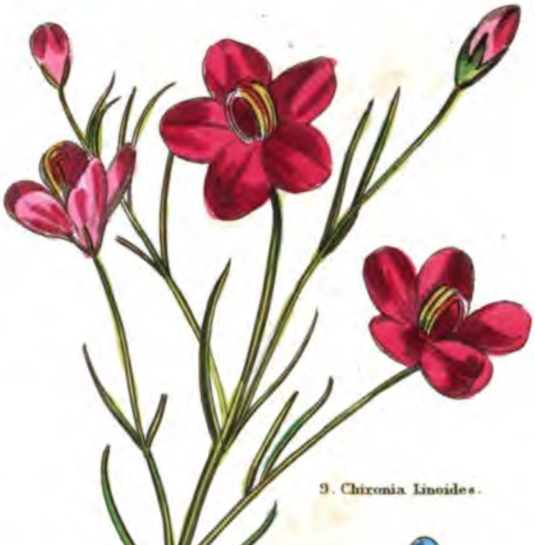
6. Moræa tricolor.



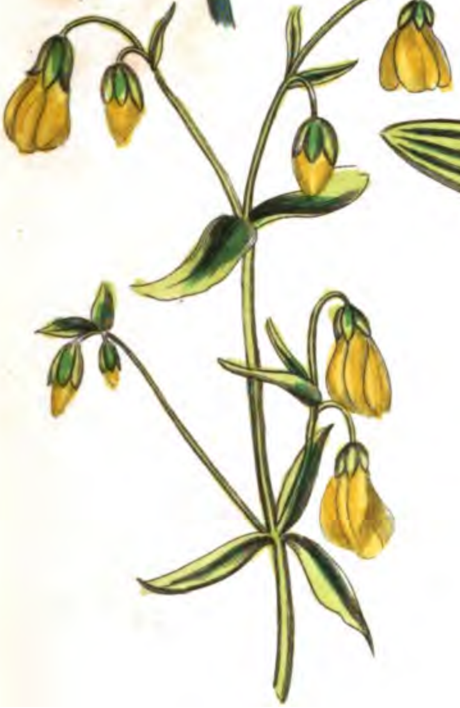
7. Gentiana Saponaria. var. a.



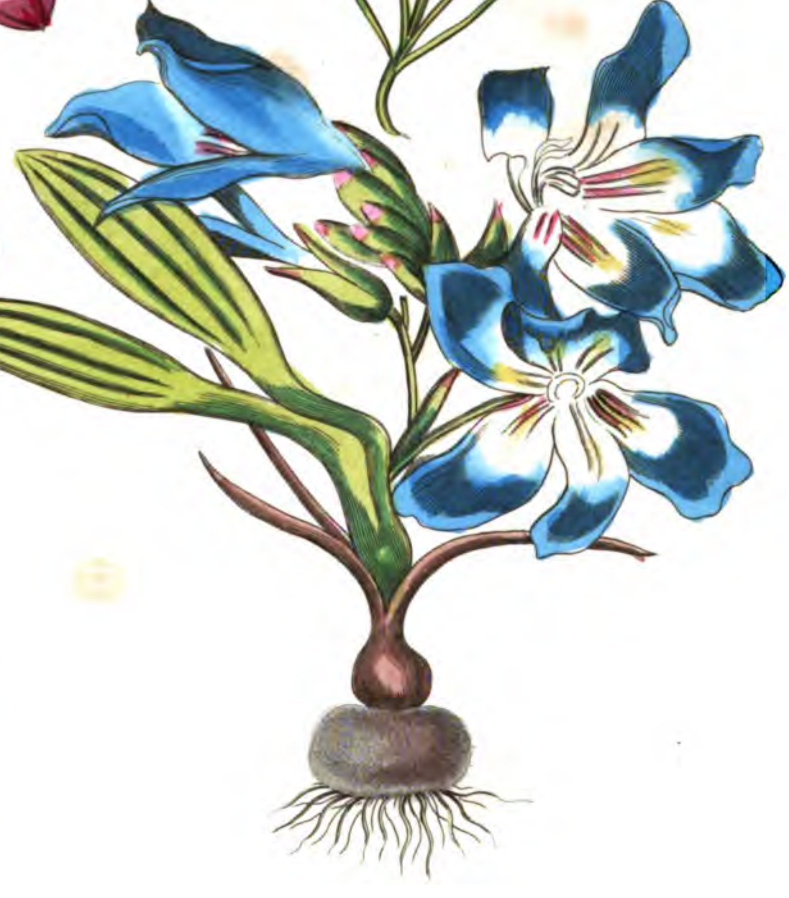
8. Dahlia vara.



9. Chironia Linoides.



10. Mahernia odorata.



11. Gladiolus nanus.

THE
MAGAZINE OF BOTANY, GARDENING,
AND
AGRICULTURE,
BRITISH AND FOREIGN.

APRIL, 1836.

ON HEMP.

THE hemp (*Cannabis Sativa*) is a very fine and graceful plant. It grows with us in the fields, to the height of five or six feet, but in the richer soils of warmer countries it attains to a much greater elevation. In the fertile plains of Lombardy it rises to the height of twelve feet or more; and, mingled with the maize and other cultivated plants, gives an air of surpassing richness to the landscape. The leaves are slender, hairy, digitate, serrate. In the female plant the flowers are solitary in the axils: in the male, they are in thin pendulous spikes, at the ends of the stem and branches.

The hemp is supposed to be of eastern origin, but like many other plants generally cultivated, it is difficult to ascertain the original place of its native growth. It is very generally diffused over the world, and has been used for supplying cordage and cloth for a period unknown; for this its tough, durable, and elastic fibres are suited beyond any other substance. The supply of hemp for the cordage and canvass of the shipping of this country is immense, and forms a vast trade with the ports of the Baltic. But, besides being used for the canvass of sails, sacks, and other coarser fabrics, hemp is employed in forming numerous cloths used in domestic economy, as towels, coarser tablecloths, and the like. They possess this advantage over Irish and other linens, that their colour improves in wearing, whilst that of the latter declines. British hemp, properly manufactured, stands unrivalled in its strength, and is superior in this respect to the Russian.

The hemp raised in England is not of so dry and spongy a nature as what we have from Russia, and therefore it requires a smaller proportion of tar to manufacture it into cordage. Tar being cheaper than hemp, the rope makers prefer foreign hemp to ours, because they can make a greater profit in working it: but cordage must certainly be stronger in proportion as there is more hemp and less tar in it, provided there be a sufficient quantity of the latter to unite the fibres.

It does not seem that the *Bangue* of the East Indies, or the great Chinese hemp, or the large sort which Parkinson received from Virginia, are different from our hemp, except in size.

Hemp is named in German *Hanf*, or *Hampf;* in Dutch *Hennip* or *Kennip;* in Danish *Hamp;* in Swedish *Hampa;* in French *Chauvre;* in Italian *Canapa;* in Spanish and Portuguese *Canamo;* in Russian *Konapli, Konopel, Kanaple;* in Polish *Konop;* in Illyrian and Sclavonian *Konoplija;* in Walachian *Kænepe;* in Hungarian *Kender;* in Tartarian *Kinder;* in Armenian *Kanop;* in Arabian *Sjaranck;* in Persian *Cannab;* in Chinese *Ma fuen, Chu tsao.* There can be no doubt but that the Greeks took their name from the Eastern *Kanop* or *Cannab,* and that the plant originally migrated into Europe from those countries, notwithstanding what Pliny and Dioscorides affirm of its growing wild in Europe.

Hemp, like *flax,* prefers a rich vegetable soil, but is not at all nice in the choice of soils, growing in clay, sand, or peat, provided merely the land is kept rich with manures. Hemp, too, possesses the curious anomaly of growing upon the same spot for successive years, without degeneracy.

For hemp the land may be prepared in the same manner as for flax. But hemp, unlike to flax, may precede, or follow a crop of corn in the rotation; and the reason is, that while flax invariably renders the land more foul, the tendency of hemp is to smother and choke all other plants. Grass seeds cannot be sown with hemp, because they would be destroyed under the shade of its thick foliage.

Hemp may be introduced into the rotation in such a manner as the following:—1. Fallow or green crop; 2. Wheat; 3. Sown grasses; 4. Hemp; 5. Oats. Or, 1. Fallow manured; 2. Wheat, or other corn crop; 3. Sown grasses; 4. Oats; 5. Hemp manured; 6. Corn crop. Or, in very rich soils, hemp may follow hemp, provided the land is largely manured every second year.

The *land* intended for hemp should always be ploughed in time to receive the influence of frost; and when it follows a corn crop, besides a deep ploughing before winter, it should receive two or more ploughings in spring, so as to reduce the soil to a fine tilth, and free it of all root-weeds. It must be well manured with twenty-five or thirty horse loads of muck, or from sixteen to twenty loads of dung per acre.

The *period* of sowing hemp is later than that of sowing flax, for it is more easily injured from the frosts of spring. In the southern and central countries of England it may be sown towards the end of April, but in Scotland and the north of England it should not be sown sooner than the commencement of May.

The *best seeds* are held to be those obtained from Riga; but, wherever the seeds are procured, care must be taken that they are fresh, which will be known by their being heavy and bright in the colour.

The *quantity* of seeds sown to the acre is generally from two to three bushels, and the common method of sowing is broadcast. But hemp is well suited to be sown in rows, this method of cultivating it presenting the advantages of allowing the intervals to be well tilled, and of admitting air to the plants. The birds must be kept off the land till the plants appear, as they otherwise devour a large proportion of it in a very short time.

The *distance* between the rows may be thirty inches. The horse and hand hoe may be both employed. In the first hoeing, the plants should be hoed out to the distance from each other of a foot in the rows, and, after the interval of a month or six weeks, another horse and hand hoeing should be given, which will complete effectually the summer culture of hemp.

But the common practice in the hemp districts is to sow broadcast, hoeing the plants to the distance from each other of a foot or sixteen inches, and giving another hoeing after an interval of a month or six weeks. There are other districts, again, in which it is common to give no other culture than to pull up the larger weeds, trusting to the rapid growth of the hemp to overtop all kinds of plants.

As the season advances, the hemp grows with great rapidity, and in autumn it is pulled up. But the circumstance of the male and female flowers being on different plants, gives rise to a peculiarity in the method of treating the hemp, which exists in the case of no other of our cultivated plants.

The male plants are distinguished from the female by their producing numerous flowers. These, after they have stood sufficiently long to discharge their pollen, are pulled up, the female plants being allowed to stand for several weeks longer, to ripen their seeds. The period of pulling the male plants is generally five or six weeks before pulling the female or seed-bearing plants. Thus there are two harvests of the hemp, the one five or six weeks before the other.

When the period of pulling the male plants, (or the *fimble*, *femble*, or thimble hemp as they are called), arrives, which is denoted by the forming of the seeds upon the female plants, the pullers walk between the drills, when the row system is adopted, and, when the broadcast is used, in the furrows between the ridges, and stretching across, pull up the stalks, taking care not to tread upon or break down those that are to remain. The male plants are easily known at this time by their yellowish colour and faded flowers; when pulled, they are tied in small bunches, previous to being carried to the pool to undergo the process of steeping, as in the case of flax.

The second pulling takes place when the female plants (seed hemp, or as they are usually denominated, *karle* hemp) have matured their seeds. This is known by the brownish colour of the capsules, and by the fading of the leaves.

The plants are then bound in bunches, a yard in compass, and set up on end in the same manner as sheaves of corn, and kept in the sun for a few days to dry. When the whole are so dried that the capsules can be easily rubbed from the stalk, the sheaves are slightly thrashed, and thus the capsules are separated from the stems. When hemp is intended for making thread only, without any regard to the seed, the male and female hemp is pulled together, thirteen or fourteen weeks after sowing, and bound up in small bundles. These bundles are called *baits*.

The male plants undergo a process of steeping before the female plants. The manner of performing it is in both cases the same. But often the female plants do not undergo the process of preparation in the same year, but are stacked, so as to be prepared in the following spring and summer. Clay pits are preferred to running water for the operation of steeping or *water-retting*. They are cleaned out once in seven or eight years. As it is in some cases necessary to economise the water used for steeping, the water of one pit or pool is made to serve the purpose of successive waterings. Sometimes five waterings take place in the same pool; but there should not, if possible, be more than three without the admixture of fresh water, since the fresher the water is the better, as the first water always produces the best colour, in the least time.

The bunches are generally placed in the pool in rows, crossing each other, and pressed down by some heavy substance laid upon them, so as to be kept from rising to the surface, care being at the same time taken that they be not so loaded as to be forced down to the bottom. If the weather be warm, four or five days will frequently be sufficient; if not, two or three more; but the period is denoted by the stem being so softened that the outside coat shall come easily off. Care must be taken, as in the case of flax, that the putrefactive process does not proceed so far as to injure the cortical fibres. The quantity put into one pool may be the produce of an acre, but it is better that the quantity be small and the pits shallow. When the hemp is thus steeped, it is, like flax, taken out of the pool and carried away to a plat of sward, on which the plants are spread singly and regularly; this is called *grassing*.

The hemp thus spread out, lies three, four, or more weeks upon the surface, and is turned over not less than three times a-week if there be showers, and twice a-week if not. It is thus subjected to the further influence of the rains and dews, and the decomposition of the ligneous part of the stem becomes hard and brittle. When the hemp is seen to be in a fit state for removal, it is taken from the ground, bound into bundles of eight or ten *baits*, and carried home to the barn, where it undergoes the process of bruising by the machine called a *Breake*, as in the case of flax. When thus prepared, it is bound up in bunches, generally weighing a stone each, and carried to market. The hemp which breaks off in the operation is technically termed *shorts*, is bound up by itself, and is half the value of the long hemp. The refuse is called *hemp-sheaves*, makes good fuel, and generally sells at two pence a stone.

Often the steeping process or water-retting is omitted, and the hemp is simply dew-retted. Thus, when the female plants are not immediately prepared, but are dried and stored up during winter, they are not put into the steeping pool, but spread on the sward early in the next season, as in January or February, and regularly turned and exposed for a sufficient time to the influence of the weather. In this manner the necessary decomposition of the stem takes place; but it is always better to hasten the fermentative process by steeping, the texture of the hemp being injured by too long exposure.

ON THE TREES AND PLANTS OF NEW SOUTH WALES.

(From the Journal of a recent Traveller).

The principal trees in the colony are the following:—
Iron Bark (Encalyptus resinefera), used for building, but more for fencing.
Blue gum (Encalyptus piperita), used for ship-building and wheelwrights.
Black-butted gum, the same.
Grey gum, for fencing, building, &c. &c.
Stringy bark, for boards and building purposes.
Box, for wheelwrights, ploughs, &c.
The last are also varieties in the encalyptus.
Forest oak (Casuarina torulosa), Swamp oak (Casuarina paludosa), for shingles and cabinet work
Cedar (Cedrela Australis), for cabinet work.
Turpentine (Tristania albicas), boats, &c.
Sassafras, sometimes three feet in diameter, for flooring (it is not common).
Mountain ash, two kinds, for carriage work.
Sallow, for gig-shafts.
Pear (Xylomelum pyriforme), for gun-stocks.
Apple (Angophora laceolota), for boards and building purposes.
Currajong, bark used for making cordage.
White Cedar (Melia azederach), for boards and boat-building.

Several kinds of acacia are also to be met with, and a considerable quantity of gum might be procured from this tree; but it is entirely neglected, though perhaps not inferior, in some respects, to the gum Arabic. Acacias have often been observed to spring up on spots lately cleared, surrounded by forest, and many miles from the nearest place where this tree is known to grow (such is likewise the case with couch-grass), but how to account for this is no easy matter. We are told that, in Russia, when the pine-forests are consumed, they are not succeeded by the pine and fir tribe, but by birch, poplar, lime, and other trees; and in America, a field that had been cultivated during a series of years, but which had previously produced nothing save oaks and chestnuts, produced, when left to itself, a thick grove of white pines! So likewise when ashes are strewed on high and arid heaths in England, clover and vetches are said to make their appearance; and in East Friesland wild clover is made to grow by strewing pearl ashes on peat and marshes! It is not unlikely that some effect of the same kind may be caused by the ashes of the trees burnt in New Holland.

The trees attain a surprising height, the stems sometimes rising from fifty to eighty feet or more, with a few straggling branches on the top, which have a most uncouth appearance, the entire height of the tree being scarcely under 140 feet, and often exceeding that.

One would imagine that a tree of this height, and too large to be grasped (they may frequently be seen from five to ten feet in diameter), would be utterly inaccessible, yet a New Hollander will easily ascend the loftiest in the forest! While the great toe of each foot rests on a notch, and the left hand is employed to steady the person, with the assistance of another notch, the right hand is used for cutting one above; the native then holding the tomahawk with his teeth ascends one step, and thus he proceeds until he attains the summit! In the meantime his companions wait paitently at the foot of the tree, prepared to knock on the head any animal that may attempt to escape; or by applying smoke at a hole below, drive it upwards, when the black who has ascended is sure to secure it. In this manner they capture opossums, flying squirrels, &c.

Many trees have been named according to the caprice of the colonists; the pear, oak, and several others bearing no more resemblance to those of other climes than the beech does to the yew.

A large proportion of the forest-trees are decayed in the heart, so that it is no uncommon circumstance to cut down four or five before one is found fit for use, unless for fencing. May not this be caused by the fires which prevail every year, for the grass being ignited, scorches the bark of the tree, and driving the sap to the heart, causes a superabundance in that particular part? It has often excited surprise that even a single tree should escape from the tremendous fires which so frequently occur! The fire almost always runs up the bark to the topmost branch, making the tree as black as charcoal; yet it goes on flourishing, although every succeeding year brings a recurrence of the same scorching, and, occasionally, twice in the same season: sometimes, indeed, the tree is destroyed, and nothing remains but a huge black and hollow stump. It often happens that a shrub, or young tree, is so effectually charred externally, that a person naturally infers it must have perished, but in the course of a few weeks it will throw out leaves, and as some of these shrubs are naturally of a lively green, the contrast between the green and black is rather singular.

To a person who has been in an American forest, and sank up to the middle in decayed vegetable matter, or springing upon the apparantly sound trunk of a prostrate tree found himself half buried in it, there is something very striking in the forests of New Holland, where one so often observes a soil composed of nothing whatever save sand, or sand and iron-stone, with a scanty herbage insufficient to conceal it. And even where the soil is of a good quality the herbage is not always over-luxuriant. A species of cotton plant was introduced some years since by an officer, who fancied it would eventually form an article of export; but it has proved a greater pest than that nuisance the broom plant at the Bermudas, (introduced as being good for hedges); nor can it possibly be eradicated, for the seed is carried by every breeze to distant places, where it grows with the greatest luxuriance, and is now rapidly overrunning the colony. As it appears to require a certain temperature, one may hope the climate of the elevated districts will prove too cold for so useless a plant.

Some of the tropical fruits thrive quite as well at Sydney as in their native climes, and oranges, lemons, limes, loquots, &c. may be had in abundance; European fruits succeed better at Bathurst and in Argyle, no fruit peculiar to warm climates growing there. The vine grows uncommonly well, and the varieties now in the colony are very numerous: and as the settlers are directing their attention to the making of wine, there is every probability of their ultimate success provided they will but have paitence. That which has hitherto been made has proved what may be done if the wine be kept sufficiently long.

The native fruits of the country are the cherry, raspberry, currant, and gooseberry: they are chiefly used for preserves.

Tobacco is cultivated by most of the settlers, and is now become an article of export of some consideration, but the curing of it is not yet fully understood. The sugar cane grows well at Moreton Bay, or Port Macquarrie, and will most probably succeed further north as well as at the Mauritius. In short, within the course of another generation the colony may be expected to export, or supply itself with, sugar, coffee, indigo, tobacco, opium, and many other articles—perhaps even silk.

Vegetation is most astonishingly rapid in these regions; and although the reader should not yield implicit faith to what I may write upon this subject, he may chance to meet with some person who has been in the colony, and will then find, that however exaggerated he considers many circumstances in this narrative, and however much he may think I have availed myself of the right claimed by all travellers of amplifying, I have nevertheless stated nothing that cannot be corroborated by any settler in Australia! In order that I may not draw too largely upon his stock of faith, I shall only mention one or two examples.

At Liverpool, in a small garden or rather court yard, I was shown a cabbage, the stalk of which, though crooked, was yet five feet and a half high; and to the uppermost flowers (it had not run to seed) the height from the ground was *thirteen feet*, as measured by an officer of the army and myself: it had produced three heads. At Edinglassie, a beautiful spot on the Nepean, the Rosa multiflora grew from twenty to *thirty feet* in two years; and, at a farm on the Hunter, the boughs of a willow had grown sixteen feet in less time. As to the rapidity with which grafts produce fruit and fruit-stones or seeds, plants of good size, it so far exceeds every thing of the kind in England, that although a traveller, and consequently accustomed to "see strange things," I dare not describe it. Land which at my former visit to New South Wales (1830) was entirely clear of wood, is now (1833) thickly covered by trees of some size; and it always happens, that land once cleared and neglected for a year or two, becomes concealed by a forest far more dense than any before seen upon it. Most of the trees are ever-green, consequently the eye dwells eternally upon a forest that, instead of the bright and varied tints in which nature is arrayed in other countries, presents to view the olive hue which has so often been observed to detract from even an Italian landscape; and the circumstances of many of them shedding their bark, which is seen hanging in long strips from the stem or branches, tends not to improve the effect. The acacias, when in flower, are assuredly very beautiful, but in looking over a forest they are not distinguished; as, if they grow there, they are over-topped by all the tribe of encalyptus.

I cannot but think the colonists might more generally introduce the various European trees upon their farms; for if no immediate advantage accrue to themselves from doing so, their children, at all events will derive some benefit from it; and this point might just as well be taken into consideration in Australia, as in England. Surely our umbrageous and ornamental trees, setting aside the value of the wood when arrived at maturity, would conduce infinitely more to the beautifying of an estate than the huge ungainly gums, crowned with a few scattered branches, and affording little or no shade, so commonly seen throughout the settlement. Even by encouraging clumps of acacias, the appearance of the country would be improved; but the usual excuse is, that both time and labour would be required, as well as land, and that all three are too valuable to be expended upon that which will make no quick return. Very little of the first, and not much of the other two, could be required for a few seeds of the oak, or any other tree; and one or two gentlemen in each colony being of the same opinion, have put into the ground many hundreds of young plants and seeds.

M. O. R.

ON THE HORSE CHESTNUT TREE.

THAT magnificent and stately tree, the horse chestnut (*Æsculus Hippoedstanum*), is a visitor from Asia, too well known to need description; yet two persons would be likely to describe it in very opposite terms; for there are few plants, great or small, about which people differ so widely; one calls it handsome and stately, another heavy and clumsy. It is certainly ornamental when in leaf, and yet more so in the bravery of its blooming thyrses; but, in its winter nakedness, it is like a clumsy living faggot, wholly destitute of grace or apparent beauty. I say apparent, for it has hidden beauties; to which, perhaps, may be attributed some portion of its clumsiness. The buds, which at a distance appear like so many knobby ends of a bundle of thick sticks, will amply repay a careful examination: they are of two kinds, the smaller, leaf-buds; and the larger, flower-buds. A celebrated German naturalist detached from this tree, in the winter season, a flower-bud not larger than a pea, in which he could reckon more than sixty flowers. The external covering was composed of seventeen scales, cemented together by a gummy substance, and protecting from moisture the down which formed the internal covering of the bud. Having carefully removed both the scales and down, he discovered four branch leaves surrounding a spike of flowers, and the latter so clearly visible, that, with the aid of a microscope, he not only counted sixty-eight flowers, but could discern the pollen of the stamens, and perceive that some was opaque, and some transparent. It would be more advisable for the young student to gather one of these buds in the early spring, when the sun is just beginning to melt away the gum with which the scales are sealed together. If his surprise at the fact here related have touched upon incredulity, he will then believe and admire; as he becomes more familiar with such objects, his doubt and wonder will probably be diminished, but his interest and love of nature will be proportionally increased. The examination of buds, bulbs, and seeds will afford an endless source of entertainment and admiration to the young botanist: he will be surprised to learn by how many miniature plants he has unconsciously been surrounded in the depth of winter. There are comparatively few seeds in which he may not see something of the future plant: he may witness the early promises of spring while luxuriating upon the ripe fruits of autumn. Even in imported fruits he may behold life as it were waiting to start into action: let him split an almond, and between the two sides, which are termed the cotyledons (cavity, from the Greek), and which are the storehouses from which the young plant draws its nourishment, he will perceive two small leaves, regularly formed and veined, and wanting only light to give them colour. Of the bulbous flowers, one of the most obvious in this embryo state is the tulip, on account of its size. Carefully stripping off the coats of the bulb one by one, the miniature plant may be discovered snugly cradled in the centre. We cannot have a better specimen of the early formation of plants in the bud, than that of the horse chestnut.

THE BANANA TREE.

The Banana (*Mùsa Sapientum*, Lin.) differs from the plantain in having its stalks marked with dark purple stripes and spots, and the fruit is shorter and rounder. Some botanists, however, consider them as only one species. The fruit is mellower than the other, is eaten raw or roasted, in fritters, preserves, or mar- [illegible] juice affords an excellent wine. malades, and the fermen[illegible] Wynnstay. It has been fruited for upwards of twenty years, at [illegible], the seat of Sir W. W. Wynne, in Denbighshire. Specimens were sent to the Horticultural Society, which were between four and five inches long, and possessed an agreeable, luscious, and acid flavour, and the produce from a single plant is "so abundant, as to entitle the banana to be considered as a useful fruit for the table."

Propagation and Culture.—Suckers rise from the root, which should be planted in light rich earth, in pots, and afterwards, if the plant is cultivated for its fruit, planted in a bed or pit of earth, kept rather moist. The plant at Wynnstay was planted in the pit of a stove, about 1811. It was then about six feet high, with a single stem. In each succeeding year it has produced a bunch of fruit; but last year two bunches; the first was ripe in May, the other in August, having about four dozen fruit on each bunch. The plant is now eighteen feet high, and measures four feet round at the bottom.

ON THE AMARYLLIS.

The *amaryllis*, *lis narcisse*, French; *narcissenlilie*, German, and *giglio narcisso*, Italian, is a splendid genus, of which most of the species are frame, greenhouse, or stove plants, and natives of the Cape of Good Hope, China, or South America. Various hybrids of this family, of great beauty, have been produced by Herbert, Sweet, Gowen, and others.

The great art in the propagation and culture of these, and all other bulbs, is to procure vigorous leaves, as on these depend the quantity of nutritive matter prepared and deposited in the bulb, and consequently its ability to flower the following season. The circumstance of several of these plants, as the Guernsey lily, flowering in the autumn, and producing their leaves afterwards under the disadvantages of a winter's sun, is the reason why they have been hitherto cultivated with so little success in this country, and why we are obliged to import the bulbs annually from other countries. The observations of Knight on this subject are particularly valuable; they more immediately refer to the Guernsey lily, but they are equally applicable to all exotic bulbs. "Bulbous roots increase in size, and proceed in acquiring powers to produce blossoms, only during the periods in which they have leaves, and in which such leaves are exposed to light; and these organs always operate most efficiently when they are young, and have just attained their full growth. The bulb of the Guernsey lily, as it is usually cultivated in this country, rarely produces leaves till September, or the beginning of October, at which period, the quantity of light afforded by our climate is probably quite insufficient for a plant which is said to be a native of the warm and bright climate of Japan; and before the return of spring, its leaves are necessarily grown old, and nearly out of office, even when they have been safely protected from frost through the winter. It is, therefore, not extraordinary, that a bulb of this species, which has once expended itself in affording flowers, should but very slowly recover the power of blossoming again. Considering, therefore, the deficiency of light and heat, owing to the late period of its vegetation, as the chief cause why this plant so often fails to produce flowers,* I inferred that nothing more would be required to make it blossom, as freely, at least, as it does in Guernsey, than such a slight degree of artificial heat, applied early in the summer, as would prove sufficient to make the bulbs vegetate a few weeks earlier than usual in the autumn. Early in the summer of 1816, a bulb, which had blossomed in the preceding autumn, was subjected to such a degree of artificial heat, as occasioned it to vegetate six weeks, or more, earlier than it would otherwise have done. It did not, of course, produce any flowers; but in the following season it blossomed early and strongly, and afforded two offsets. These were put, in the spring of 1818, into pots, containing about one-eighth of a square foot of light and rich mould, and were fed with manured water, and their period of vegetation was again accelerated by artificial heat. Their leaves, consequently, grew yellow from maturity, early in the present spring, when the pots were placed in rather a shady situation, and near a north wall, to afford an opportunity of observing to what extent, in such a situation, the early production of the leaves in the preceding season had changed the habit of the plant. I entertained no doubt but that both the bulbs would afford blossoms, but I was much gratified by the appearance of the blossoms in the first week in July. From the success of the preceding experiment, I conclude that if the offsets, and probably the bulbs, of this plant, which have produced flowers, be placed in a moderate hotbed, in the end of May, to occasion the early production of their leaves, blossoms would be constantly afforded in the following season: but it will be expedient to habituate the leaves, thus produced, gradually to the open air, as soon as they are nearly fully grown, and to protect them from frost till the approach of spring."

The Rev. W. Williamson has adopted the same rationale as Knight; and, with the aid of a glass frame, without artificial heat, brought bulbs which had flowered into a state to flower again after two winters. Had he applied artificial heat, he thinks one winter might probably have been sufficient.

The Hon. and Rev. W. Herbert has found a similar treatment attended with corresponding success. He says, "the only attention which the Guernsey lily requires here (Spofforth, Yorkshire), is to give it sufficient air while the leaves are growing, that they may be strong and dark-coloured; to protect the leaves from frost, keeping the pots near the light, if under glass; to give a moderate and regular supply of water, and to leave the bulbs nearly dry, from the time the leaves decay, that is, about midsummer, at latest, to the end of August, when the flower-buds should appear. If the bulbs are not left dry early in the summer, the autumnal shoot will be delayed till the season becomes too cold for the proper growth of the flowers or leaves, and the natural course and vigour of the plant will be interrupted, after which it will require at least a year to repair the injury it will have received. Whenever the sprouting of the bulb is tardy, it should be assisted by placing it, for a short time, in a warmer situation. If the stigma does not expand so as to become, after a few days, trifid, it is a sign that the temperature is rather too low to suit the plant, and the leaves will probably not push freely without more heat. I have obtained seed from the Guernsey lily by procuring the blossom early in an airy situation." The soil Herbert recommends is a good yellow loam, without any manure; but he thinks "they will thrive in any wholesome compost, which does not canker their bulbs. They should be planted partly above ground, for the wet earth round their necks will prevent their flowering or thriving, and will even sometimes destroy them." The same treatment, with very few exceptions, he adds, suits the whole of the bulbs included under amaryllis, as well as a number of other allied genera, as Hæmanthus, Pancratium, Agapanthus, &c. Some species of these genera, as Amaryllis longifolio *W.* and Crinum asiaticum *Rox.*, are natives of dry ditches that communicate at certain seasons with the water of the rivers in Bengal, where they root deeply in the mud. These species, and some others, Herbert found to succeed perfectly when plunged during summer in a pond. "Most of the crinums," he says, "are swamp plants, or grow in river-mud, and should be cultivated in our stoves, with a pan of water under them, the bulbs being raised above the earth, and stripped of all dead integuments. Agapanthus umbellatus flowers best when so treated; the amaryllis longifolia," which, he says, "should be named crinum capénse, will," he has no doubt, "flower as a hardy aquatic, if planted in any pond or river of two feet water, not liable to freeze at the bottom."—

ON THE WILLOW HERB.

The willow-herb is a large and beautiful genus, of which we have nine native species: it derives its English name from the form of its leaves, and the watery situations in which it is found. The botanical appellation, *epilobium*, signifies a violet on a pod; but it must be acknowledged that the flower has very little resemblance to a violet, either in form or colour; neither is its pericarp properly termed a pod: it is inferior, quadrangular, one, two, or three inches long, according to the species, and more or less tinged with red; it is composed of four pieces called valves which form the sides, and is divided into four cells by as many partitions extending from thence to the angles of the quadrangular receptacle. If the seed-vessel be carefully opened on one side, when ripe, a sort of silky feather will immediately spring out, as if weary of confinement in so narrow a lodging. Each seed is winged with these silken feathers, in which they lie embedded, until the valves make a way for them to take flight, and by their means the plant is disseminated over various parts of the country. The seed-vessel is crowned by the calyx, which is red, of one leaf, tubular at the base, with the upper part (botanically termed the limb) divided into four segments, between which are inserted the four petals, which are of a paler red. The stamens, four of which are longer than the alternate four, are affixed to the throat of the calyx (the top of the tube) between the petals: the stigma is, in some species, divided into four segments curving downwards at the extremity, and forming a cross; in others, it is obtuse and undivided. The two handsomest of our native species are *E.* angustifolium (narrow-leaved), and *E.* hirsutum (hairy); the latter, as commonly as the former is rarely, to be found in a wild state; the one a frequent inhabitant in shady lanes, the other generally cultivated in flower-gardens, where it spreads but too quickly; are rivals in elegance and beauty. The other species are smaller, but none are deficient in beauty.

ON THE HEATH.

The heath, erica (from the Greek, *ereiko*, to break; why so applied is uncertain), though a very extensive genus, is not so widely disseminated as might be supposed; the vast continent of America does not produce a single species, while the Cape of Good Hope has more than three hundred. We possess but three native heaths, and of these three one is confined to the county of Cornwall. The foreign heaths are so tenderly bred in this country, and so carefully preserved from the roughness of the elements, and vicissitudes of the season, that we see them always, as it were, in full dress: did we see them in their native land, as we do our own heaths, we should not, perhaps, treat the latter with such comparative contempt. The cross-leaved heath (*E.* Tetralix) is a remarkably elegant plant, with its flowers collected together into crowded heads: they have a smooth and wax-like appearance, very similar to the blossom of the Arbutus. The fine-leaved (*E.* cinèrea) is very common on dry sandy grounds, and is often cut, together with ling, for making brooms, and for fuel. Ling is employed in Scotland in building and thatching cabins, and for rustic beds; in the isle of Islay it is mingled with malt in brewing beer.

ON THE PROTEAS.

Among all the plants of the Cape of Good Hope, next to the heaths in variety and beauty, stand the proteas. In the stem, the leaves, the flower, and the fruit of these plants, there appears such diversity, as if nature had created them with a view to setting botanical arrangement at defiance; and the name imposed on the genus would seem to indicate that she has been in some degree successful. The protea argentea grows to the height of a middling-sized tree; while the protea repens, at the other extreme, creeps along the sand, and bears at the point of its slender stem, a flower, which, from its size and colour, might be mistaken for an orange. The intermediate space is occupied by upwards of sixty species, which display an astonishing diversity in form and habit. Some have small flowers which attract the attention of no one except the botanist; others at the elevation of a few inches, bear a blossom that exceeds in size the crown of a hat, and excites the admiration of the most careless observer. In the flowers of some species, particularly the protea mellifera, a vast quantity of honey is secreted, which attracts swarms of bees, beetles, and other insects, whose variegated colours and active movements heighten the interest of the scene; nor is this interest at all diminished when the certhia chalybea, or cape humming bird, joins the animated group, and perching on the border of the chalice, darts its tubular tongue into the bottom of the flower, or snaps at the insects as they buzz around.

The protea argentea is diœcious. The fertile flowers are separated by the scale of the cone. The corolla is four-petalous, tubular at the base, coherent at the throat, and the border, covered externally with long white hairs, spreads over the edge of the scale. After the germ has been fecundated, the scales begin to grow, and at length overtop the petals, gathering them in a bunch entirely concealed from view. When the fruit is become ripe, the sun begins to act on the scales; they curl out at the top, and contract at the base, gradually squeezing out the nut, until it arrives at the top of the aperture—an operation facilitated by the claws of the petals, which had expanded during the process of maturition into a thin pellicle, covering the nut, and enabling it to slide smoothly through the narrow interstices of the scales. While the nut is in the act of emerging, the border of the corolla again spreads out, and the down stands erect, giving it a feathery appearance, resembling the seed-down of a syngenesious plant. In this state it remains ready to be wafted by the first gale that blows; but, to insure the ultimate object of nature—the transportation of the seed—the long capillary style and its round stigma remain attached to it, and the latter being too large to slip through the narrow throat of the corolla, the seed is thus suspended by the style, and descends to the ground somewhat in the manner of an aeronaut in his parachute.

ON THE CLEMATIS.

Most of the hardy species of clematis are natives of the middle and south of Europe, and of North America; a few of them are natives of the north of Africa, some of Siberia; there are several in the Himalaya, one in China, and several in Japan. The genus has been known since the days of Theophrastus, and has received various accessions from the time of Matthiolus to the recent introductions from the Himalaya. The acrid properties of the clematis are well known to herbalists. The bark, leaves, and blossoms are used to raise blisters on the skin, or to produce a slight external inflammation: taken internally they are a corrosive poison. The flowers contain a peculiar substance, called clematine, which is similar to gluten; the green leaves, bruised, are applied to ulcers, to produce sloughing. The floricultural use of these plants is, to cover bowers, or ornament verandas or trellis-work. The greater number of them ripen their seeds in England, and are easily propagated by them, or by layers. They all require support by props of some kind; and all grow freely in any soil that is tolerably dry, but more especially in one that is calcareous. From the acridity of these plants, they are not very liable to be attacked by insects; nevertheless, snails and slugs are occasionally found eating their young herbage. Most of the species and varieties are to be found in the botanic gardens of Europe, and the more ornamental of them are cultivated for sale in the principal European and American nurseries.

THE MOUNTAIN PEONY.

Mountain peony *(P. Moutan)*, appears to have been first observed by Europeans in the gardens at Canton, where, however, it is neither indigenous nor propagated; but the plants are brought by the commercial gardeners of the provinces of Nan-Kin and Ho-Nan, where it is a native, and sold by them to the merchants and others possessing gardens at Canton. From Chinese drawings, and from the extravagant praises bestowed upon this plant in the Mémoires sur la Chine, published by the missionaries, an ardent desire was excited, in Sir Joseph Banks and others, to import plants into England; and, previously to 1786, Sir Joseph Banks engaged Mr. Duncan, a medical gentleman attached to the East India Company's service, to procure a plant for the royal garden at Kew, where it was first received, through Mr. Duncan's exertions, in 1787. Various plants have since been imported by different individuals, mostly of the common sort (*P. M.* Banks*ii*), but including also some of the varieties which have been enumerated above. In 1803, the *P. Moutan* was introduced into France, and various other parts of the continent of Europe, having been sent from the Hammersmith Nursery to the garden of Malmaison.

The Chinese are said to propagate this plant by seeds, in order to procure new varieties; but they also multiply it by parting the roots, and by layers and cuttings; and it is said that " they generally inoculate the buds of different varieties upon the several branches of the same colour. When the time of flowering approaches, they carefully remove all the superfluous buds, in order to strengthen those which they intend to expand; and these they also protect from the scorching heat of the sun."—*Kæmp. Amœn.*

THE STATE OF AGRICULTURE AND BOTANY IN MADAGASCAR.

Agriculture is very carelessly performed in ever part of Madagascar. The natives are too indolent, and they leave almost every thing to nature. Contented with stirring up the ground with a spade, and scattering a few seeds, they are sure of reaping a harvest which will supply all their wants during the year; and though the inhabitants of Emerina are compelled, by the nature of the soil, to take rather more pains, yet there we may see, with regret, large tracts of land lying fallow, which might produce enormous crops, and where now the careless inhabitants only plant a few plots of rice. Here, as elsewhere, it seems reserved to European industry to transform these deserts into habitable tracts; for, with proper care, they would produce six times the food requisite for the present number of inhabitants.

Rice, the great object of Madagascar culture, and the principal article of food, is well known to prefer the marshy spots; consequently, the low lying grounds, where the water does not run off, or the sides of the river, where inundation is easy, are preferred for this purpose. After having divided the plot into little squares with the spade, called Fangadi, the rice is thrown in, which soon germinates, and, after transplantation, yields a hundred fold. The manner of planting rice is different among the Béhtanihména. These people do not sow their seed, in order to transplant it afterwards, but put in the rice as we do kidney-beans. They select the gloomiest spots, even the centre of a wood, and, having cleared a space of ground, they dibble holes with a sharp pointed stick, and drop in the grain. This is done twice a year; and from this district the finest and whitest rice in Madagascar is obtained. The ground is frequently changed, and another spot cleared: but after two or three years the natives return to the original place, and cultivate it anew; and wherever they sow their seed, there they are sure of an abundant return, independent of the state of the weather. Sometimes they select a half dried marsh, and sending in their oxen they drive them backwards and forwards till the ground is become like wet mud, when they put in their seed. Every fortnight, or at longest, monthly, the soil is carefully cleared of weeds, until the rice begins to flower, after which it remains undisturbed. Women and children only are employed in the culture of rice, the men assisting to clear the ground. Thus it may be observed that the inhabitants of Madagascar could hardly maintain themselves without the existence of these extensive marshes, which constantly exhale pestilential miasmata, and to which the insalubrity of the climate may justly be attributed.

An exact enumeration of all the *indigenous Madagascar plants*, is, and will long remain, a desideratum in botany. Centuries must previously elapse, and the knowledge can only be obtained through the exertions of the sons of the north, who will render the climate of Madagascar less prejudicial by extending the limits of its cultivation, and exploring the hitherto undiscovered districts. The productions of the west, north, and southern coasts, and of all the interior, remain entirely unknown, and the slender documents that have been furnished as to the vegetation of the N. East, by the French naturalists, most of whom have perished from the effects of the climate, serve rather to stimulate, than to satisfy, the curiosity of the botanist.

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Botanical Rambles within Thirty Miles of London. By Daniel Cooper. 1 vol. 12mo. London: Highley. 1836.

With the work before us for a companion, we could range with enthusiastic delight through groves and gardens, in the pathless forest, the broad savannah, or the mountain glen, and could find "society where none intrudes," in the sweet companionship of flowers, from their earliest germ to the full expansion of their beauties in the summer's sun. Botany has of late years not only become one of the principal studies of the schools, the recreation of the man of business, and the delight of the philosopher, but has received the attention and fostering care and patronage of the British fair. To disseminate still further the love for this fascinating science, and spread the seeds of information, to give delight to kindred bosoms, and to induce those who have as yet been strangers to the subject, to "consider the lilies of the field," has been truly said to be "an object worthy of a good man." We shall not labour to prove how delightful and instructive it is to

> "Look through nature up to nature's God."

Neither, surely, need we demonstrate, that if any judicious or improved use is to be made of the natural bodies around us, it must be expected from those who discriminate their kinds, and study their properties. But we would recommend botany for its own sake, as a mental and heathful exercise; raising curiosity, gratifying a taste for beauty and ingenuity of contrivance, sharpening the powers of discrimination, and a rich source of innocent pleasure. Botany has also an advantage over many sciences in the easy attainment of its subjects; its pleasures lie within the grasp of all:

> "So spring the living herbs profusely wild,
> O'er all the deep green earth."

And whether, in the spring, when nature is "putting forth the tender leaves of hope," and "daffodils begin to peer;" or "in the glory of the summer months;" or during the autumnal walk, when a new colouring is added to existence, and nature is maturing her treasures for another year, and forming her "seed within herself;" or in the winter, when in the deep recesses of the leaf-strewn woods, the mosses are displaying their wonderful fructification; much may always be found to admire and instruct, and investigation will reward us with satisfaction and delight. So pure and serene are the pleasures of this science, that the man who loves botany for its own sake, would find himself neither solitary nor desolate, had he no other companion than a "mountain daisy," that "modest crimson-tipped flower," so sweetly sung by one of nature's own poets; but would esteem it a privilege to walk with God in the garden of creation, and hold converse with his providence, exclaiming, "These are thy glorious works, parent of good."

None of the amusements of human life are more satisfactory and dignified than the investigation and survey of the workings and ways of Providence in this created world of wonders, filled with his never-absent power; it occupies and elevates the mind, is inexhaustible in supply, and, while it furnishes meditation for the closet of the studious, gives to the reflections of the moralizing rambler, admiration and delight, and is an engaging companion that will communicate an interest to every rural walk.

Flowers are universal favourites, and some of our earliest and most pleasing associations are connected with them; many of the most delightful days of leisure in our youth, "when life and all its charms are new," have been spent in

> "Rambling in the woods,
> To pull the flowers so gay."

Flowers, in all ages, have been made the representatives of innocence and purity. We decorate the bride, and strew her path with flowers; we present the undefiled blossoms, as a similitude of her beauty and untainted mind, trusting that her destiny through life will be like theirs—grateful and pleasing to all. We scatter them over the shell, the bier, and the earth, when we consign our mortal blossoms to the dust, as emblems of transient joy, fading pleasures, and withered hopes; yet rest in sure and certain trust, that each, in due season, will be renewed again. The love of flowers seems a naturally implanted passion, without any alloy or debasing object as a motive; we cherish them in youth—we admire them in declining days with pleasure and affection. No portion of creation has been resorted to by mankind with more success, for the ornament and decoration of their labours, than the vegetable world. Plants, their foliage, flowers, or fruits, as the most graceful, varied, and pleasing objects that meet our view, have been universally the objects of design, and have supplied the most beautiful, and perhaps the earliest embellishments of art. The pomegranate, the almond, and flowers, were selected, even in the wilderness, by divine appointment, to give form to the sacred utensils; the rewards of merit and the wreath of the victor, were, in the early ages, arboraceous. In later periods, the acanthus, the ivy, the lotus, the vine, the palm, and the oak, flourished under the chisel, or in the loom of the artist; and, in modern days, the vegetable world affords the almost exclusive decorations of ingenuity and art. Poets, both ancient and modern, have been profuse in their admiration of these fairies of creation; but, perhaps, none ever discriminated their peculiarities in form, colour, or circumstances, with such a philosophical nicety, as our own sweet bard of Avon, that great master-mind that struck Promethean fire into words, and bade them stand out to the world as the ever-living symbols of his own mighty conceptions. Witness in his descriptions of flowers in the "Winter's Tale," how correctly he marks the gentle approach of the Spring by the

> ——————— "Daffodils,
> That come before the swallow dares, and take
> The winds of March with beauty."

And, again, in the "Midsummer Night's Dream,"

> ————"Tunable as lark to shepherd's ear,
> When wheat is green, and hawthorn buds appear."

Such language must surely find a response in every bosom; but to the man whose mind is already imbued with a love of the subject, 'tis magic, renewing associations of days that are past, and reviving hope for those that are to come. Independent of these feelings, vegetation is highly worthy of our attention, and, in itself, is of the utmost consequence to us, supplying our necessities, and administering to our comforts.

We now conclude these remarks by recommending to all lovers of botany, the very excellent work under our notice.

ON GRASSES.

Grasses, strictly so called, are those plants which have a hollow-jointed stem, whose flowers, for the most part, have three stamina and two feathery styles, included between chaffy husks, instead of that kind of corolla which is common to most flowers. Thus grasses are separated from the clovers, the rushes, carices, &c.

The grasses cannot boast the brilliant colours of the tulip, the auricula, and many other plants; but yet they have charms of their own, which must delight every close observer. The different tints of green which a collection of them (about one hundred and seven species are found wild in this country), exhibits in the month of May, especially, if gently agitated by the wind, cannot be observed, even by the most careless person, without exciting the most pleasing sensations. And though there be great similarity between most of the species, at first sight, this apparent similarity vanishes, when the student becomes acquainted with the several parts of which they are composed.

The roots of grasses are chiefly annual or perennial; very few of them biennial. They propagate themselves in various ways.

1st. By seed, as those most do which are strictly annuals. Most of the perennial species are also propagated by their seeds. Grasses growing in mountainous situations are apt to become viviparous, in which case the spike, instead of producing seed, throws out new shoots or young plants, which by their own weight fall to the ground, and taking root, answer the purpose of seed.

2nd. Grasses growing upright, or nearly so, are increased by roots sent forth from the base of the stalk, which by the farmers is called tillering. As this disposition is increased by the plants lying close to the ground, rolling in certain cases becomes highly beneficial; particularly after long continued frosts, when the roots have been almost thrown out of the ground.

3rd. There are some grasses whose stems lie flat on the ground, and send forth a root at each joint.

4th. Other species are increased most plentifully by means of creeping-roots.

It becomes perfectly manifest from these observations and classification of the usual modes in which grasses are propagated, that an intimate acquaintance with their botanical characters may be turned to great practical advantage in improving pasture lands, or laying them down for grass. But this view will be greatly strengthened, if we bear in mind that there are many bad grasses as well as unprofitable species. They may, though good in themselves, produce so small a crop as not to deserve cultivation, as the sheep's *fescue* grass. They may either from their roughness, bad taste, or some pernicious quality, be such as cattle will either reject, or be injured by eating them, as the *wall-barley* grass. They may be apt to die on the ground, and give the meadow a disagreeable aspect in winter, as the *agrostis* tribe; or they may blow late in summer, and not be fit for mowing till most of the good grasses are decayed and gone off; and thus may a pasture be filled with weeds as effectually as if they were more obviously so.

Surely then it must be worth the farmer's while to be at pains in the selection of the seeds, and in the after management of the plants, which he cultivates on his meadow or pasture lands, more especially, as there are thousands of acres in this and every other country, which might be made to produce double and treble the crops they already do, by a judicious introduction of grasses; and also, because when once so laid down, land can ever afterwards with comparative ease be kept filled with good kinds, and ever look pleasant.

The following six kinds of grasses have been recommended by some scientific and practical cultivators of pasture lands. It would be quite easy to multiply the list, which however might increase the difficulty of the operation, though it is probable that some others besides those about to be specified might be preferred. No one ought to expect wonders from a few short directions. So much depends on seasons, and on minute diversities of soils and climates, that any enumeration of rules, or statement of facts, could not possibly meet every case, or be with safety implicitly followed. We shall, however, first mention generally the species of grasses particularly recommended, and the soils suitable for them; secondly, the manner in which land may advantageously be laid down with them; and thirdly, offer some observations as to the mode in which pastures are to be kept in good condition, improved, and renovated.

The grass seeds particularly recommended, are—

Anthoxanthum Odoraum, (Sweet-scented Vernal grass), of all our English grasses, excepting one species, comes first into blossom. It grows in all kinds of soil and situation, being found in bogs, in woods, and in rich meadows, as well as dry pastures. In point of crop, it is not so productive as some, yet more so than others. Cattle are fond of it. It is odoriferous, as its name imports, and gives the agreeable scent which characterizes new made hay.

Alopecurus Pratensis (Meadow Fox-tail grass). produces its spike almost as early as the former. It is also much larger and quicker in its growth, and much more productive. It produces a very plentiful aftermath. In general, the great advantage arising from these two early grasses, is lost at a distance from large cities, and where the husbandman waits for a large crop of indiscriminate herbage, rather than of grass. The meadow fox-tail grows naturally in a moist soil; hence it is best adapted to improve wet ground that may be drained, or to form or meliorate meadows that have a moist bottom.

Poa Pratensis (Smooth-stalked Meadow grass), begins to shoot and to assume a beautiful verdure early in spring, but its flowering stems are not produced so soon by a week as those of the *Alopecurus*; but yet it ranks very properly with the two preceding, and for early pasturage, these three will meet the wishes of the cultivator. If crop be at the same time an object, the meadow fox-tail grass should predominate.

The Poa Pratensis rather affects a dry than a moist situation, and hence it keeps its verdure well in a dry season. Yet it will grow on the top of a dry wall. It has a root that creeps like couch grass, and is almost as difficult to extirpate; therefore, it ought to be cautiously introduced, where the pasturage is not to be permanent. In dry soils its roots mat together and tend to exhaust the ground.

Poa Trivialis (Rough-stalked Meadow grass), is in several respects very similar to the last mentioned grass; yet they are very different in their qualities. The rough-stalked species principally occurs in moist meadows, or on the edges of wet ditches; it also loves shelter; hence, though highly productive it is tender. It is a principal grass in some uncommonly productive meadows.

Festuca Pratensis (Meadow Fescue-grass), comes the nearest of any mentioned to Rye-grass; to which however, it seems greatly superior, for the purpose of forming or improving pastures. It is more productive of foliage, it is perennial, and it is hardy, thriving not only in wet, but in dry ground. It abounds in the very best meadows near London. It also produces a great quantity of seeds, which are easily gathered; but it does not flower earlier than the middle of June. It must be carefully distinguished from the *Festuca elatior* (tall fescue-grass), which is very similar, but much coarser.

Cynosurus Cristatus (Crested Dog's-tail grass), is a great favourite, and wholesome food for sheep; it is also found in our soundest and best pastures. It grows naturally in dry situations, and will not thrive in meadows that are very wet. It flowers about the same time as the meadow fescue-grass, and it is not very productive of foliage. As its flowering stems and heads are always left untouched by cattle, its seeds may easily be collected, where the pasturage is fed. It may on several accounts be thought less favourably of, than the previous five.

It thus appears that meadow fox-tail and rough-stalked meadow grasses are fittest for moist land—that meadow fescue, or sweet-scented vernal are for land moist or moderately dry, and that smooth-stalked meadow grass and crested dog's-tail, are for dry pasture. But as in the more southern parts of this kingdom, it is not to be expected that dry soils can be so easily clothed with verdure as in moister and northern places, grasses that send down roots to a great depth, such as *Lotus Corniculatus*, *Medicagofalcata*, &c. should be introduced in any general selection.

Though *Lolium Perenne* (Perennial Darnel or Rye-grass) be one of the most important of the gramineous herbage plants, and the most generally cultivated in Europe, owing to its early maturity, its wide range of temperatures and soils, and the abundance as well as facility with which it can be raised from its seeds, and suited beyond any others for being mixed with the clovers for hay, it yet wants certain properties which others of the grasses possess, for forming a good permanent meadow. This will be best procured by imitating the natural process of mixing grasses together; whether those that we have particularized as the best, must be left to competent judges who have experimentally tried them.

We observe that the Professor of Agriculture in the University of Edinburgh, has in his late work entitled the "Elements of Practical Agriculture," said that the native grasses which experience has fully shown to be of a superior class and suited to cultivation, are—

1. Alopecurus Pratensis—Meadow Foxtail.
2. Phleum Pratense—Meadow Catstail.
3. Festuca Pratensis—Meadow Fescue.
4. Poa Trivialis—Rough stalked Meadow grass.
5. Dactylis Glomevata—Rough Cocksfoot.
6. Lolium Perenne—Rye grass.

But whichever of the lists may be adopted, certain clovers should be added to every meadow.

We come to the second point, as to how the sowing of the seeds is to be conducted, and the land prepared for them. And here an account of how a nursery of grasses ought to be established and managed might be given. This however, is in a great measure unnecessary, as the regular seedsmen are generally abundantly supplied with a variety of grass seeds for the market. Well then, the land being thoroughly cleaned, (which may be done if very foul, by paring off the sward and burning it on the ground; or still better, by ploughing it and harrowing it repeatedly, burning the roots of all noxious plants, and employing some cleansing crop, such as turnips, potatoes, or tares in the meantime, to aid the process and repay the expense); the grasses and clovers are generally sown in spring, upon ground from which a corn crop is to be taken. The same seeds may also be sown in autumn without any corn crop, which is recommended in the case of laying down land for permanent grass, as being calculated to form a quicker and better sward; but then this method is by a sacrifice of a crop of corn, which is too great in the case of a farmer's practice. The proportion in which the different kinds of clovers and grasses are sown, is chiefly dependant upon the time which the land is to remain in grass. When sown with the corn, in the following autumn, they will cover the surface, and the land may be slightly pastured with sheep. During winter it must remain untouched. When one year old grass, as thefarmers call it, or when the plants are in their second year, they will feed the larger cattle perfectly, or they may be mown two or more times, and the aftermath pastured; nor is there any period in the growth of such a crop, at which it will afford so rich an herbage.

A composition of seeds, of the kinds recommended by us, amounting to about three bushels to an acre, on a suitable soil, and in a favourable situation, will form an excellent meadow in two years; nor will the plants afterwards readily allow their places to be usurped by noxious productions. When such, however, insinuate themselves, they must be kept down.

We are now therefore brought to offer a very few observations as to how the pastures are to be kept in order.

The advantages resulting from keeping land free from stagnant water are great. Even under-draining is of the utmost importance to the preservation of the more valuable species of herbage, and to the meliorating any particular kind.

The best manure for grass lands is lime, or composts of earth and lime. But the soil is naturally benefitted by the very circumstance of its being allowed to lay in grass, provided it is not overstocked.

The chief injury which land sustains when left long in grass, is the decay of its herbage by the springing up of inferior plants; the most common being the Musci or Mosses, which are altogether innutritious, though they occupy the place of valuable plants. The best method of destroying these is by draining and liming, but old land, when overgrown by them or other injurious productions, should be taken up, undergo a course of tillage, and again laid down as before.

If improving the pasture rather than laying it down anew be the cultivator's object, then after eradicating as well as possible all noxious plants, let some rotten dung be thinly spread over the meadow, about the beginning of September, at which time the worms throw up great quantities of earth, which contributes to prevent the growth of moss, as well as affords fresh soil for the roots of grass plants to shoot into, and for seeds to vegetate in; bush and harrow it, sow on it the same composition of seeds as before, but in a smaller quantity. If the meadow be very rich, the dung will be less necessary.

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Arboretum Britannicum; or, the Hardy Trees of Britain, Native and Foreign. Part XVII. By G. C. Loudon, F. L. H. G. and Z. S. &c. London; Longman. 1836.

This work still deserves, in our opinion, the favourable eulogium we before passed on it. The part now under review principally relates to the order Magnolia, in which much research and care is evinced. We will extract the author's account of the introduction into Europe of the Magnolia Grandiflora:—

"The precise date of the introduction of M. grandiflora into Britain is uncertain. In the Hortus Kewensis it is stated, on the authority of Catesby, that it was cultivated before 1737 by Sir John Colliton, at Exeter; and, as far as is known, the tree there, which is the parent of all those varieties bearing the name of M. g. oxoniensis, was the first which was raised or planted in England, and, in all probability, in Europe. This tree, a notice of which will be found in the Gardener's Magazine, vol. xi. p. 70, was cut down, through mistake, about the year 1794. It had previously been much disfigured from the great number of layers that had been taken from it; and, though the trunk was 18 inches in diameter, its height was not more than five feet. It had been surrounded by a scaffolding for many years, on which tubs were placed to receive the branches laid down for propagation. The tree seems to have been rented by different gardeners, who at first sold the layers at five guineas each; but the price gradually fell to half a guinea. From the source of supply being in this part of England, it will readily be conceived that the largest specimens are in Devonshire. None of these, however, of which we have been able to obtain dimensions, exceed 30 feet in height. Collinson mentions, that on returning to Goodwood, after nine years' absence, he found two plants of Magnolia grandiflora in flower; and that he had a plant, raised by himself from seed, which flowered for the first time in 1760, when twenty years old.

"The history of the introduction of the M. grandiflora into France is thus given by M. Merlet de la Boulaye, professor of botany at Angers, in the new edition of Du Hamel:—'There is at Maillardiere, distant about five miles from the town of Nantes, a fine magnolia, which was brought from the banks of the Mississippi in 1732, and planted in a poor soil. It grew there more than thirty years without any care having been taken of it; as the marine officer who brought it died soon after he had planted it, and his heirs did not trouble themselves about a tree which had as yet produced them nothing, and appeared to them merely a variety of the Cerasus Laurocerasus. M. Bonami, a physician of Nantes, and professor of botany there, who published a Flora of this district, recognised, in 1758, this beautiful tree to be the Magnolia grandiflora of Linnæus; and, at the meeting of the states of Bretagne, which was held at Nantes in September, 1760, he presented to the princess of Rohan-Chabet a fine branch of this magnolia in flower, which became a subject of conversation and interest to all there assembled. Louis XV. possessed several small plants of the magnolia grandiflora in his garden of the Petit Trianon, but they did not thrive; and, having heard of a magnolia 35 or 40 feet high, which every year was covered with fine flowers of a delicious perfume, he sent two of his gardeners to ascertain if it was possible to transport this fine tree to Versailles; and, above all, should they do so, if it would be certain to grow. They saw the tree; and, being of opinion that it would not survive removal, it was suffered to remain in its place. This magnolia was at that time, from 35 to 40 feet high; but, during the troubles of the civil war of La Vendée, it was mutilated, and lost most of its branches. Afterwards, the burning of the house near which it was planted having damaged its fine head, it was treated as an orange tree injured by the frost; that is to say, the branches were cut off close to the trunk. It shot out vigerously; but the young shoots, not having had time to ripen, were destroyed by the frost. Notwithstanding this check, it again recovered, and afterwards became a fine tree, between 25 and 30 feet high, with a large, well-proportioned head, and a trunk four feet in circumference, the lower branches sweeping the ground; and the whole tree producing annually from 350 to 400 large, elegant, and sweet-scented flowers. The seeds, however, never arrive at perfect maturity; although the fruit attains its full size, and remains upon the tree till the following spring.' (Nouv. Duh. i. p. 220.) This tree, as we have noticed, still exists, and is now upwards of 30 feet high, and 100 years of age.

" M. grandiflora, soon after its introduction into France and England, would doubtless find its way into the botanic gardens of Germany. In Italy, the first planted trees were in the botanic garden at Padua, where, in ninety years, they have attained the height of 60 feet, with trunks four feet in diameter; and in the botanic garden at Pisa, as we are informed in the Nouveau du Hamel, it produced perfect seeds, from which plants were raised by M. Marmier, on his estate at Rois, near Besançon. The tree has been introduced into the botanic gardens of Spain; also, it is believed, into those of South America and India, and into the gardens of China."

After which we have here given us the particulars of its properties and uses, together with descriptions of the soil and situation most fitted for it, with the various methods of propagation, rules for the choice of plants, and directions for its planting, culture, and management, all of which we quote:—

" *Properties and Uses.*—The medical properties of the genus have been already mentioned. In Europe it can only be considered in the light of an ornamental tree, or rather, perhaps, shrub; as, generally speaking, it can only be cultivated with success when trained against a wall.

" *Soil and Situation.*—In Europe, a deep sandy loam, dry at bottom, and enriched with vegetable mould or heath soil, seems to suit all the varieties of this species. The situation in the colder parts of Europe may be exposed to the direct influence of the mid-day sun; but, in the south of France, and in Italy, the tree always thrives best when in the shade of other trees; and in these countries, also, it requires a moister soil than in England. Where the tree is to be treated as a standard, the situation should be sheltered from the points from which the highest winds are expected, but it should be open to the south or southeast, to admit abundance of light and warmth. In general, where the fig tree will grow as a standard, and survive the winter without protection, there the Magnolia grandiflora may be planted, and treated as a standard also. The best situations are, the south-east margin of a shrubbery or wood, a sheltered place on a lawn, or an open glade in a plantation. Perhaps the finest situation for displaying the flowers of this tree, as a standard, would be a sloping bank of sandy soil facing the south-east. Here it might be mixed with a few of the deciduous magnolias, and particularly with M. conspicua and Soulangeana, which, as they flower before their leaves come out, would be set off to great advantage by the evergreen leaves of M. grandiflora. When this species is to be trained against a wall, any aspect may be chosen, except perhaps the north-east. To display the flowers to the greatest advantage to a spectator walking in a direction nearly parallel to the wall, the ground plan of the latter should be curvilinear, by which means a direct or front view of a considerable portion would be brought before the spectator. In general, a segment of a circle will be sufficient for a short wall; and two or more segments, forming an ogee, or a serpentine line, for a longer wall. In a very exposed situation, a magnolia wall, twenty or thirty feet high, might form three parts of a round tower, open at top; the lateral opening facing the south, and the trees planted inside the tower. All the trees might easily be protected by throwing a slight roof of boards over the tower during winter. If the tower were not more than twenty or thirty feet in diameter, the walls, if built of brick and cement, need not be thicker than nine inches, even if made thirty feet high. Magnolias might be grown in the inside of such a tower, and camellias on the outside. The wall may be of any height, from ten to twenty feet, or even fifty feet. A wall covered with evergreen magnolias, interspersed with a few plants of M. conspicua, forms a beautiful medium of connection between a conservatory and a flower-garden or shrubbery; or it forms an admirable northern boundary to a winter walk, or a winter flower-garden. The finest magnolia wall in England is that at White Knights, near Reading; it is 145 feet long, and 24 feet high. The upper part of it is formed of trellis-work, which projects with a curve, the tangent to which forms an angle of perhaps 45 degrees with the face of the wall. On this trellis the upper branches of the trees terminate, and, by their projection, protect all those beneath them from perpendicular rains or snows. Such protection, however, is altogether unnecessary, as the magnolias against walls, in Messrs. Loddiges' arboretum, and in various nurseries and gardens about London, abundantly testify. Indeed it cannot fail to be ultimately injurious, not only by keeping off perpendicular rains, but by excluding the direct influence of the sun's rays from the upper part of the tree. As this species of magnolia does not flower till June or July, its blossoms are in no danger of being injured by frost; and therefore it requires no projecting coping, or covering of any sort, during winter, at least about London. Where danger is anticipated from severe frost, attention should be directed to protecting the roots, and especially the collar and the stem, for two or three feet above the ground.

" *Propagation*, in the London nurseries, is generally effected by forming stools either in warm situations in the open air, to be protected during winter, or in cold pits. The shoots are laid down in autumn, and require two years to become sufficiently rooted for separation; they are then potted, and kept in pits or under glass during winter, and set in the open air, in a shady place, during summer, till wanted for final planting. M. grandiflora is also occasionally raised from American seeds; but as plants so originated are much longer in coming into flower than plants raised from layers, they are not in demand.

" *Choice of Plants.*—In no case whatever would we recommend purchasing any species of magnolia not grown in a pot; because plants so grown may be sent to any distance without injury to the roots, which are few and succulent, and easily damaged by exposure to the air and light.

" *Planting, Culture and Management.*—In planting, the ball should be carefully broken by the hand, and the roots spread out in every direction, and covered with heath mould, or a mixture of leaf mould and sandy loam. The soil ought to be made firm to the fibrous roots, not by treading, but by abundant watering, and, if the plant be large, by fixing with water; that is, while the earth is being carefully put about the roots by one man, another should pour water over it from a pot held six or eight feet above it, so that the weight of the water may wash the soil into every crevice formed by the roots, and consolidate it there. Shading will be advisable for some weeks, or even months, after planting: to a standard, this may be given by placing a cone of wicker-work over the tree by day, and taking it off at night; or by sticking a few spruce fir or other twiggy branches in the soil round it, or at least on the south side. Against a wall or trellis, it may be sheltered by an old net during day, which is to be taken off at night, or by any other convenient means. If the magnolia be intended to form a handsome tree as a standard, it should not only have a sufficient depth of suitable soil, and a dry sheltered situation open to the south, but it should be pruned to a single stem for at least three feet or four feet from the ground, to direct the growth to the head. If the plant does not grow freely after it has been three or four years planted, it ought to be bent down to the ground, and kept in that position till it throws up one strong shoot from the collar. The old stem should then be cut away, leaving only the new shoot, which will probably extend to three or four feet the first season and, will soon form a handsome tree. The greater part of the magnolias which are planted as standards, as far as we have been able to observe, are treated in such a manner that they can never be expected to become any thing else than mere bushes. The soil is not properly prepared; or, if prepared, a sufficient quantity of it is not brought together: because to admit of this species growing to a tree, the subsoil ought to be prepared by art as well as the soil. The plants, too, are generally turned out of their pots without breaking the ball, and spreading the roots; and it has been ascertained, that the Magnolia grandiflora, and various other exotic trees, when treated in this manner, will remain for several years before the roots strike into the adjoining soil. If the Exmouth variety of this species be made choice of, layers will produce flowers in a year or two after being separated from the parent plant, if kept in pots; but when they are planted out, and grow freely, so as to make shoots two or three feet every season, they will probably not flower for three or four years. Whether the tree be against a wall or trellis, or treated as a standard, all the pruning it will require, after it has begun to grow freely, will be to cut out the stumps from which the flowers or the strobiles have dropped off, and any dead or decaying wood, and any branches which cross and rub on each other. For a few years after being planted as a standard, it may be advisable to form a small cone of thatch, litter, leaves, or spruce fir branches, round the stem, as practised by M. Boursault in Paris. M. Boursault found that, by this kind of protection, he could grow the magnolia and various other exotics, as standards, to a size which had never before been seen in Paris (See Gard. Mag. ii. p. 63.) Magnolias against a wall require very little protection, even when young; and this can easily be given by mulching the ground at the roots, and covering their branches with a mat, or with the fronds of the spruce fir."

We have now given what we think will be considered a fair specimen, and will leave our readers to form their own opinion of the merits of the work.

ON THE VARIETIES OF CLIMATE AND PRODUCTIONS IN THE RUSSIAN EMPIRE[*].

PREVIOUS to entering on the immediate subject of this dissertation, it may not be superfluous to take a brief view of the causes of diversity of climate in general. These may be divided into common, natural, and local, the latter not following, but to a certain degree changing, the ordinary laws of nature.

To the common and natural causes belong, first, the principal and well-known one of latitude; and, secondly, the longitude; for it is ascertained, that, in the northern parts of Europe and Asia, the climates of places situated on the same degree of latitude become colder in proportion to their eastern longitude. But this increased severity of climate extends only to a limited distance eastward, gradually diminishing again as we approach the eastern ocean. Thirdly, the greater or less elevation above the sea: thus, in Mexico, on the elevated table lands, in the interior of that vast country, the mean heat of the year is only 10 deg. (Reaumur). In general, the more elevated the situation the greater the cold, so that the summits of all the highest mountains are perpetually covered with snow.

To the accidental and local causes of variation of climate belong the vicinity of the place to the ocean, or to some other great expanse of water; the quantity of forest; the position of the hills and valleys; the shelter afforded from the most prevalent cold or hot winds; the nature of the soil, and its more or less advantageous slope towards the south. The climate of a whole province may be beneficially affected by the change or removal of one or more of the above causes, as, for instance, the clearing away of superfluous forests, the draining of bogs, and even the cultivation of the soil. But the excessive or total destruction of the woods of a country is injurious to its climate as connected with the fertility of the soil.

The local causes which affect climate are various in their nature, some favourable, and others unpropitious to the growth of plants and the labours of the agriculturist. In sheltered spots, and on a fertile soil, we sometimes see fruits and plants arriving at perfection, which, by their nature, would seem to belong to a more southern degree of latitude. Not only plants and animals are affected by these local variations of climate; but man himself is not exempt from their influence. But perhaps in no instance is their effect so strikingly visible as in vineyards, where one spot will produce wine of a superior quality, while another, at no great distance, and equally well exposed to the rays of the sun, will furnish a very inferior sort. The vicinity of a river, the nature of the soil, and the slope of its surface, are perhaps the principal causes; but these shades of difference in the local nature of a climate have no influence on its general character. There are some extraordinary instances of sudden transition, where the districts are, separated, even in a longitudinal direction, by a chain of mountains or a river. This is observable on the Vistula, the Nieman, and the Dneiper, where a sensible increase of cold may be felt on the eastern side. Sometimes the most striking phenomena proceed from these accidental causes; it is well known, that diversified as is the climate of the various regions of the globe, the transition from the cold to the warm is exceedingly gradual; but there are many exceptions, where, by the influence of local circumstances, the productions of the south are fostered on the north, although they may again disappear in places of a still more southern latitude, or western longitude.

Having made these few preliminary observations we shall now proceed to our immediate subject, and divide Russia into the following climatic regions. 1st. The Region of cIe. 2nd. The Region of Moss. 3rd. The Region of Forests and Pasturage. 4th. The Region of Barley, and the beginning of Agriculture. 5th. The Region of Rye and Flax, or of settled Agriculture. 6th. The Region of Wheat and Fruit. 7th. The Region of Maize and the Vine. 8th. The Region of the Olive-tree, the Silk-worm, and the Sugar-cane. Such is the vast gradation from north to south. What immense resources must a country possess that embraces such an extent of territory and diversity of climate!

In adopting this division of climatic regions, it must be remembered that they do not run exactly parallel to the equator, but decline to the south, in proportion as they extend eastward, without noticing those more minute varieties of temperature produced by accidental causes, which carry these imaginary boundaries sometimes more to the south, at others more to the north, as, for instance, on the summits of the Ural Mountains, where the cold is severe, or in some sheltered spots on the rich soil of the government of Vologda, where it is unnaturally genial.

1. *Region of Ice.*—The icy region may be considered as including Novaya Zemlia[*], part of the Kolskaya district, and the extreme northern points of land which project into the Frozen Ocean. This region is distinguished by a night of three months' duration, and its total destitution of vegetable productions, which circumstances render it unfit for the permanent habitation of man and domestic animals. The seal, the walrus, and fish of various descriptions which abound towards the pole, supply the only means of sustenance for man, the polar bear, and its inseparable companion the fox; except on Novaya Zemlia, where multitudes of a peculiar kind of mice breed, and lay up heaps of roots for their winter store: these mice serve, in their turn, as food for the bears and foxes.

The maritime enterprizes undertaken by the commercial house of Brandt in Archangel, may probably furnish us with more authentic information concerning these parts. They have been conducted with as much courage as perseverance, and although the profits arising from them may in some measure supply the place of agriculture, yet they cannot be said in any way to be connected with it.

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[*] From the Quarterly Journal of Agriculture.

[*] Or the New Land, incorrectly marked on the English globes and maps Nova Zembla.

2. *The Mossy Region*—where the ever-frozen ground is covered with a kind of greyish moss, and towards the boundaries of the following region, with a kind of dwarf brushwood and fir. This tract is endowed by nature with an animal that alone makes it habitable for man, the rein-deer. Its vast deserts stretch from Archangel, along the shores of the White Sea to the Eastern Ocean, peopled by thinly scattered nomadic tribes of Laplanders, Samoyades, Ostiaks, and other aborigines, whose numbers are gradually decreasing as they come in contact with civilized nations. Besides the resources derived from the milk and flesh of the rein-deer, a considerable portion of the population is supported by fish[*]. The chase of marine animals, and such as furnish valuable furs, affords the principal employment of the inhabitants. Besides which, innumerable flocks of wild swans, geese, and other aquatic birds of passage, visit them during their short summer, and form an important part of their sustenance. Lastly, in this region, adjacent to the Frozen Ocean, at the mouth of great rivers, and near certain islands, are found those astonishing remains of antediluvian animals, particularly of the mammoth, and here was discovered that enigma for naturalists, the bones of one of those monsters, still covered with flesh and skin.

3. *The Region of Forests and Pasturage.*—By degrees the dwarf trees and brushwood of the mossy region increase in size, until we come to those immense forests, where the hand of man has not yet disturbed the majestic operations of nature. Along the banks of the rivers, and in other spots unincumbered with wood, the grass shoots up with astonishing rapidity; but the lingering frosts of spring, and the early appearance of those of autumn, prevent the cultivation of corn. For this reason the inhabitants of the northern part of this district, are principally occupied with the chase, especially that of the squirrel, an animal that seems to be indigenous there, and which forms the principal inducement for man to take up his abode in this inhospitable clime. The abundance of grass in the southern part affords the means of keeping cattle, while in some sheltered spots appear a few corn-fields, as it were, the outposts of agriculture. The northern and eastern parts of this region are inhabited by nomadic tribes, then follow the Finns or Finlanders, a settled people chiefly dependent on pasturage for support. It would be difficult to mark with precision the southern boundaries of this region, as it falls gradually into the next.

4. *The Region of Barley, and the Beginning of Agriculture.*—On account of the shortness of the summer, and the early autumnal frosts, barley is the only grain successfully cultivated here, but, with great care, several kinds of vegetables may be brought to maturity, and possibly potatoes might thrive. The inhabitants are Russians, Finns, Zirians, and others having settled habitations; but from the insignificance of their agriculture, they have recourse to grazing, fishing, and the chase, floating of timber, &c. In some parts, however, of the governments of Archangel and Vologda, are to be found a very superior breed of horned cattle. The southern limits of this region may be said to extend nearly to the town of Yarensk in the government of Vologda, and the parts of a corresponding degree of latitude, viz. the 63rd degree. Nature, as the author himself had an opportunity of observing, here assumes an imposing aspect; immense forests, vast rivers, beautiful meadows, flourishing in all the unexhausted luxuriance of primitive vegetation, make an impression on the traveller that can only be adequately conceived by those who have wandered through the unexplored forests, and beheld the majestic streams of the New World.

5. *The Region of Rye and Flax, or of settled Agriculture*—extends from the limits of the former, southward to the middle of the government of Tchernigov, or to the 51st degree of northern latitude, and the districts on the corresponding line to the eastward. It would be superfluous to enter into a minute description of this vast region, which comprises the principal part of the Russian Empire; we shall therefore content ourselves with a few partial observations.

It will readily be conceived, that the southern part has some advantages over the northern, although they are not of such a striking nature as to demand a separation; it may even be said these advantages are more than counter balanced by other unpropitious circumstances, which concur to depress agriculture, especially in Baylo Rossia (White Russia). The difference between the western and eastern extremities of this region is very striking. The climate of Moscow may be called the medium, or real Russian climate, and is exceedingly favourable for all agricultural pursuits. Towards Siberia the seasons are much more inclement; while to the westward, beyond the Dneiper and Dwina, they are so mild, that about Grodno and Baylostock plums and pears grow in the open air. Under favourable circumstances and by means of gradual naturalization to the climate, we meet with fruits even in the northern part of this region, especially apples; but even they require great care, and sometimes the trees are destroyed by the frost. The provinces situated on the Baltic, besides occupying the extreme west, are favoured by the vicinity of the sea; their climate is therefore the mildest of any in this region on similar degrees of latitude. The European part, forming one immense plain but little diversified by hills of any considerable elevation; the local difference of climate is not considerable, and arises chiefly from the forests, bogs, and the nature of the soil.

Agriculture in this region is almost, without exception, conducted on the most primitive and unimproved plan, called the *trekpolnia*, or three-field system, especially in the original Russian provinces, where we scarcely meet with any examples of the improved methods, except here and there by way of trial, or as a kind of rural luxury on the part of the proprietor; while, in the Baltic provinces, considerable progress has been made in introducing a proper rotation of crops, and in general the modern improvements in agriculture. The breeding of cattle has likewise remained in its original imperfect state, without any improvement, and existing only as a kind of indispensable appendage to husbandry. The quantity of forest land is unfortunately greatly diminishing in this region, except those parts from which wood is not easily conveyed to market. This circumstance seems to threaten the inhabitants with a dearth of that most indispensable article, and the more so, as the southern provinces, where this want is already severely felt, are principally supplied by floated timber from this region. An improved system of forest management is even more necessary than an improved system of agriculture, although the latter would doubtless greatly contribute to introduce the former, for, under proper management, much less meadow and arable land would be necessary to produce a given quantity of corn and hay, and the forests would no longer be destroyed merely for the purpose of procuring a piece of the fresh land.

The distinguishing feature of this region is vast and convenient water communication, without which the useful products of the inland districts would scarcely find their way to any market; by their means the single article of tallow is exported to the amount of forty millions of roubles annually.

6. *The Region of Wheat and Fruit.*—It must not be inferred from this appellation that these productions of the soil do not thrive in the last mentioned region, but merely that they are much more abundant here, and that the climate is more genial to their growth. This region may be said to extend to Yekaterinoslav, or to the 48th degree of latitude. Several kinds of grain, as buckwheat, millet, &c., are cultivated here with much greater success than in the last described region. The cultivation of tobacco, although it exhausts the soil, is rapidly spreading, and will eventually become a source of great profit. Hemp is also found to thrive better than in more northern situations, but the chief object of the agriculturist is the breeding of cattle. Studs of horses and sheep-farms exist here as

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[*] To counteract the ravages of the scurvy, the inhabitants employ a kind of cochlearia.

separate establishments; but the breeding of horned cattle is generally connected with husbandry, and on a much larger scale than in the northern provinces. Bee-hives are also a source of no small profit, especially to the peasants. The abundance and cheapness of corn encourage distillation. Spirit is thus the principal and almost only article of fabrication. The greater part of this region was colonized later than the preceding, and the stability of its population in the southern part can only be dated from the conquest of New Russia and the Crimea. This country may be called the granary of the empire, for it supplies not only Petersburg and the army, but furnishes the principal part of the raw productions (except flax) for exportation. We may therefore conclude, that, with even a more dense population in this fertile district, Russia would have escaped the ravages of famine, which not unfrequently in former times devastated the country. But the more confidently we rely on the fertility of this province for a supply, the more sensibly is a failure in the crops felt. A bad harvest, however, may be considered as a thing of rare occurrence.

In consideration of the vast importance of this region, we must extend our observations to several points connected with its husbandry, namely, the steppes, the population, the variations of the climate, the extent of the villages, and the general method of cultivation. *The steppes* are peculiar to eastern Europe and middle Asia; and are altogether distinct from the American savannahs, which, during the tropical rains, are partially inundated. The natural causes of the destitution of forest on the steppes are, 1st. The hardness and tenacity of the earth, which in many places is of such a nature as to prevent the growth of trees without previous digging and breaking up of the soil. 2nd. The black loam of which they consist is not favourable to the growth of forest. 3rd. The aridity of the climate and the elevated situation of the steppes, which latter circumstance probably occasions the growth of a number of dwarf fruits, especially apples, which are found on bushes no higher than the grass. 4th. The predominance of salt in many parts is not only unfavourable to the growth of trees and grass, but renders the soil unfit for agricultural purposes. The accidental causes consist in the destruction of the woods, of the former existence of which there have been discovered indubitable traces. Such destruction may be accounted for by the nomadic habits of the former inhabitants; by the burning of the steppes in dry seasons, the destruction of the young trees by the cattle, &c. This is the more probable, as from a very remote period, this country was the abode of various tribes now extinct, who carried on an unceasing predatory warfare against their more settled agricultural neighbours. Forests once thoroughly destroyed, seldom, if ever, flourish again unless cultivated by the hand of man; and the country, thus left bare and exposed to every wind, becomes arid, and the climate greatly deteriorated. It must be confessed that there is something so very peculiar in the natural features of the steppes, that the above assigned causes may appear insufficient to account for it; but it would lead us beyond the limits of this dissertation to enter more minutely into the investigation. The steppes, in general, may be divided into the grassy, the heathy, the saline, the sandy, and the stony, not to notice the low grounds covered with reeds. These steppes have considerable influence on the population and husbandry of this sixth region. If, on the one hand, they are favourable to the breeding of cattle; on the other, their destitution of wood, the unfitness of the soil in many parts for farming purposes, the variable nature of the climate, the difficulty of preserving the corn-fields from the inroads of the cattle, and, above all, the scanty supply of water, all concur to retard the adequate increase of the settled population, and to give rise to a wretched method of culture called the *perelog* plan*. The sterile part of the steppes is scarcely less profitable than that which is cultivated, for on it are found the salt lakes, probably the remains of a sea which at some former period covered the country, or perhaps their saline qualities may arise from strata of rock-salt forming their beds, or the qualities of the soil through which the various rivulets run in their course to the lakes. It is not improbable, that, by means of perseverance in an improved system of cultivation, many saline districts may become fertile in the production of useful plants. Some parts may be laid under water to great advantage, especially if they succeed in constructing conduits of fresh water. But the chief advantage derived from the steppes is the means afforded of rearing large flocks of fine-woolled sheep. If we consider the low price of land in Russia, the immense extent of the steppes that furnish good pasturage for sheep, and the cheapness of labour and bread, we may reasonably anticipate the period when Russia will furnish the greater part of Europe with wool, except perhaps the very finest sorts, which it may be more convenient to produce where sheep breeding is connected with agriculture in its highest state of improvement; and even towards this end the Baltic provinces have made considerable progress. The variety of climate in this region is much greater than in the last described. The western governments, as Kiev and Podolia, are favoured with very mild seasons, but towards the east the ungenial effects of the vicinity of Asia are plainly felt, even without entering Siberia, and the more so as we approach the limits of the next, or seventh region. This variation is distinctly visible in the productions of the earth, it being no longer possible, though on the same degree of latitude, to produce and rear those plants which thrive in the west. Perhaps, in the course of time, when the soil and forests are properly cultivated, a considerable improvement may take place in the climate.

With respect to the population of this region, it may be divided into the old established Russian inhabitants, who have from time immemorial dwelt in the western governments of Kiev, Podolsky, Malo-Rossia, &c., and those that have settled at a later period in Kursk, Saratoff, &c. The original Russian governments are pretty well peopled, according to their extent, and the imperfect system of agriculture which has hitherto prevailed—a system requiring a far greater extent of arable, meadow, and forest land than would be necessary under an improved system of husbandry; so that, in some parts, a want of land has been felt, especially in Little Russia and the government of Poltava, where the former prosperous condition of the people has been considerably deteriorated by the extraordinary increase in the consumption of ardent spirits. This deficiency of land might be remedied by colonization, which, however, would be attended with great difficulties; by the encouragement of industry in manufactories, the effects of which could not be immediately felt to any considerable extent; or, thirdly, by the introduction of an improved system of agriculture, which would without all doubt restore Malo-Rossia, and other districts, to their former flourishing condition; for those provinces, which are considered in Russia as scantily supplied with land, in other parts of Europe (not to mention England, Belgium, and Upper Italy), would, with a better system of education, be considered as having more than sufficient for a much greater population. It has been already observed, that, owing to the great abundance of unoccupied land and fertile steppes in some parts of this region, the *perelog* plan had been adopted; but, in some instances, the three-field method, and in others the rotation of crops, has been introduced. In a country abounding in fertile land, the cultivator naturally prefers tilling fresh ground to continually labouring on an exhausted soil, aware that, in so doing, he secures to his own advantage the first and best productive force of nature to aid his labours. But, with the increase of population, the period will arrive when this custom can no longer be followed. The fields which have been alternately cultivated and abandoned, gradually lose a part of their productive force, the intervals of rest for the land become shorter and shorter, the soil is impoverished, the crops diminish, bad harvests occur more frequently, the common pasturage for cattle is considerably curtailed, and the forests exist only in the memory of the aged. And this is the condition to which many parts of Malo-Rossia, and other anciently settled districts, are reduced at the present day. The introduction of the three-field system, although it be preferable to the *pereleg* plan, will not be sufficient to avert the evil consequences that must ensue, and from which nothing but the adoption of a regular rotation of crops, the proper use of manure, the cultivation of potatoes and Indian corn, the sowing of artificial grasses, beet-root, field turnips, &c., can save the inhabitants. It may be objected, and with justice, that the peasants will not be easily made to comprehend a new and improved method of cultivation, and that when they have learned it, they have not the means of adopting it fully; but still of the three alternatives it is the easiest, and in fact requires neither great exertions nor considerable outlay, on their part, while it would have an immense influence in bettering their condition. It is exceedingly desirable that a beginning should be made, and an example set, to show how much more advantageous it would be to devote attention to the improvement of husbandry than to the increase of distillation. It may likewise be objected by some, that the productions of the earth are already so abundant, that it is even now difficult to find a market for them; but, in this case, the fault must be attributed to the cultivators themselves, who think of producing nothing but corn; besides, as the population increases, towns will arise, and the demand will continually increase. It would doubtless be erroneous to suppose that, in the fifth region, there are no places sufficiently populous to require a proper rotation of crops, instead of the three-field method: in fact, it would be of immense advantage in every case, except only in those districts where there are still considerable tracts of new uncultivated land.

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* This consists in sowing corn on fresh land, until its productive powers are exhausted, and then abandoning it, to seek another spot to cultivate.

7. *The Region of Maize and the Vine.*—Although we have fixed upon the vine and Indian corn as characteristic productions of this region, it must be remembered that it produces also all those common to the last described. The vine, as is well known, thrives only in certain climates and situations; and Indian corn is not to be considered as an exclusive product, but rather as a distinguishing feature. This region includes Bessarabia, the New Russia, the territory of the Don Cossacks, the government of Astrachan, and the Caucasus. The southern part of Siberia, from the peculiar nature of the climate, can scarcely be said to form any portion of it. The greater part of the above mentioned governments and districts consists of steppes, partially used as pasturage, and in part unproductive. The Crimea (at least the southern part of it), belongs rather to the next region. The hilly parts of Bessarabia are fruitful and well supplied with wood. The low lands are steppes, which, towards the Danube, are covered with reeds, and the air unwholesome. On the banks of some rivers, and in various other parts, the vine may be cultivated to advantage. The government of Cherson presents a vast plain intersected by deep narrow ravines or dells; the soil is hard, and but little suited to the growth of trees, without the assistance of art, exposed to frequent droughts, and consequently to bad harvests; besides which it is at times (as well as other parts of the seventh region), subject to the ravages of the locust. The government of Yekaterinoslav suffers less than that of Cherson; but eastward towards the Donetsky ridge, near Bakhmut and Slavianoserbsk, droughts are more frequent. The northern part of the government consists of steppes fit for pasturage, and abounding in salt; the southern part enjoys a most genial climate, especially along the shore, where the sea has considerable influence on the atmosphere, but this tract belongs properly to the eighth region. Not only the vine and other delicate fruit trees grow here in perfection, but also the olive, the caper, &c. which have been planted, thrive, and will doubtless, in the course of time, be cultivated on a large scale. The southern parts of the government of Voronesh are steppes, but capable of cultivation. The territory of the Don Cossacks is also steppe, towards the south-east, but fit for all the purposes of husbandry. Coal is found in the Donetzky ridge, as well as mines of lead and iron. Other parts are more or less suitable for the purposes of agriculture and the growth of the vine. The government of Astracan has, in many parts, a sandy soil, affording scanty pasturage for the cattle, and the vine is cultivated in the Asiatic manner, by irrigation, which renders its fruit unfit for wine. The northern part of the Caucasus is principally sandy, interspersed with saline tracts and rivulets. Breeding of cattle is carried on to great advantage by the nomadic tribes which inhabit it. The southern parts towards the rivers Terek and Kuban are good for tillage, especially towards the west. In the environs of Kizliar, a kind of wine is made, that is chiefly used in the distilling of brandy, and no doubt there are many other situations where the vine would thrive. The territory belonging to the Cossacks of the Black Sea, consists partly of very low grounds, the rest resembles the western part of the Caucasian government. Population is but thinly scattered in this region, and the attempts at agriculture are all of recent date. A considerable portion of the population is of Asiatic origin, and not a few of the tribes still retain their nomadic habits. The other inhabitants of the country consist of Russians, Moldavians, Bulgarians, Greeks, and German colonists, the latter including the Menonists, celebrated for their superior husbandry. Gardening, as a speculation, is carried on to a considerable extent, but the numerous flocks of Merino sheep form the principal source of wealth, and they may yet be augmented to an almost incalculable extent. We may even hope to see large flocks of these useful animals, bred in Siberia, and the society formed for the purpose of introducing them is deserving of every encouragement. New activity may be instilled into this undertaking, by grants of crown lands for the purpose of establishing sheep-farms. The nomadic tribes can scarcely participate in the advantages resulting from the introduction of this breed, as the sheep require proper shelter and food during the inclemency of the winter months.

The principal defect of this region is the almost total absence of forests, and the great difficulty of rearing trees. Thus for want of wood the inhabitants are obliged to burn reeds, *buyan**, straw and *kisyak*†; but the employment of the two last mentioned articles is contrary to the rules of good husbandry, although it can hardly be said that the time is arrived for the introduction of an improved system into these provinces. It would perhaps be well, in the first place, to turn our attention to the improvement in the breed of sheep, to the laying out of gardens and vineyards, and to the cultivation of Indian corn and exportable fruits; although the sowing of artificial grasses would prove of vast advantage to the breeders of cattle, as well as facilitate the future labours of the agriculturist. Equally important is the planting of trees, not only for the sake of a supply of building timber and fuel, but also for the improvement of the climate. In the mean time, the inhabitants must be content with their present kinds of fuel, unless turf can be discovered, or the coal of the Donetzky ridge be brought into more general use. The means that may be adopted to supply the present deficiency of wood are the following: 1. To plant the larch and other quick growing trees in spots where the soil is suitable, not too elevated, and sheltered from the strong blasts which sweep the plain. Other plantations may be reared with greater facility, under shelter of the first. 2. The gradual plantation of suitable trees near the farm-houses and villages, round the fields, along the roads, and especially in the ravines, where even now bushes make their appearance. By these and similar means, in the course of time, a considerable quantity of wood may be obtained; if not larger timber, at least useful materials for a variety of domestic purposes. The branches of the willow, the poplar, and other quick growing trees may be periodically clipped, and together with the annual clearings of the gardens and vineyards, would furnish a considerable quantity of fuel: many parts of Europe are supplied by similar means. Unfortunately man is but little inclined to embark in undertakings which only present a distant prospect of reward; especially in those countries where he has hitherto been accustomed to cultivate the soil in the most simple and unimproved manner. Experience has shewn that it is difficult at first to induce him to bestow his care even on the cultivation of fruit trees, much less inclination would he have to plant those of the forest. We must, however, hope that some good examples, and the expectation of reaping at least the first fruits of their labours, will overcome these scruples, and that the desert will be made to flourish by the hand of industry and perseverance.

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* The high grass of the steppes.

† Dried cow-dung.

8. *The Region of the Olive Tree, the Silk Worm, and the Sugar-cane.*—This region includes the provinces beyond the Caucasus (Zakaukasky), but the climate, owing to the mountainous nature of the country, is exceedingly various, as may be seen by the diversity in the productions of the soil. The plants peculiar to hot climates grow in the valleys, while the hills are covered with corn and pasturage for cattle. The soil is also of various kinds, and towards the east there are extensive steppes. The local climates of this region may be divided in the following manner: first, the summits of the mountains always covered with snow; then the beginning of vegetation, where nothing but pasturage for cattle is found; then follow the corn fields; below them the vine flourishes, and we meet with the mulberry and other fruit trees; while still lower, in the vallies, particularly in the Persian provinces, grow cotton, rice, and other southern productions, which require artificial irrigation, an operation familiar to the inhabitants of Asia. The olive thrives chiefly in the western part, and only in those spots peculiarly suitable to its culture. The sugar cane, that important colonial production, has been planted, and is spreading in some of the low and rich lands about Kura; but we can scarcely expect that this branch of industry should arrive at any considerable extent or degree of perfection. This succession of climates, according to altitude, presents a curious resemblance to the climates as they follow each other according to latitude. The forest region is the only one that is wanting in the Zakaukazian mountains. The country beyond the Caucasus produces spontaneously several objects of great value, as a peculiar kind of cochineal, assafœtida, &c. which may become the sources of great ultimate advantage. The most important, however, of the productions of this region, is doubtless silk, which may be said to be indigenous to the country, and no pains should be spared to bring this branch of industry to the greatest possible degree of perfection.

DESCRIPTION OF THE PLATES.

TRITOMA UVARIA.

SERRULATE-LEAVED TRITOMA.

Hexandria Monogynia.

Hemerocallideæ.

Gen. Char.—Flower six-toothed. Stamens inserted into the receptacle, exserted, alternately longer. Capsule three-celled, many-seeded.

Spec. Char.—Leaves with keel and edge rough. Corolla clavate, cylindrical.

Leaves long, narrow, triangular, shaped like those of the bullrush. Flowers produced in close, thick spikes, upon stalks near three feet high. They are of an orange colour, when the plants are strong, and produce large spikes; they make a fine appearance. It is a native of the Cape, and flowers in August and September.

The tritoma uvaria is sufficiently hardy to resist the cold of our milder winters, but in very severe weather, requires to be protected from the frost. It is usually propagated by suckers, as also by seed, which it produces freely.

LAGERSTRÆMIA INDICA.

INDIAN LAGERSTRÆMIA.

Polyandria Monogynia.

Saluariæ.

Gen. Char.—Calyx six-cleft, campanulate. Petals six. Stamens many, of which the six outer are thickest. Capsule four-six celled, many seeded.

Spec. Char.—Stem branched. Peduncles axillary. Petals crenate, obtuse.

Branches alternate, somewhat angular, flexuose, rigid, spreading. Branchlets four-cornered. Leaves alternate, subsessile. Flowers in a decompound, trichotomous, naked, spreading panicle at the ends of the twigs. Calyx inflated. Corolla purple; claws inserted between the segments of the calyx. Filaments flesh-coloured, the length of the claws, some of them resembling the pistils, thicker, and longer than the others. Anthers round, minute, yellow. Germ superior, ovate, white. Style purple, longer than the stamens. Stigma blunt. Capsule ovate, with many seeds.

In its native country it grows to the height of six feet or more, acquires a stem the thickness of one's arm, and produces flowers the size of the garden clove, which are very showy.

The petals are curiously crisped or curled, each petal resembling, in miniature, a leaf of some of our varieties of cabbage.

It flowers from August to October; but in the greenhouse, where it is recommended by Mr. Aiton to be kept, it is not a very ready blower; in the stove it blossoms more freely. May be increased, without difficulty, from cuttings.

ADYSETON MONTANUM.

MOUNTAIN ADYSETON.

Tetradynamia Siliculosa.

Cruciferæ.

Gen. Char.—The shorter filaments marked with a toothlet. Silicle emarginate.

Spec. Char.—Stems diffused. Leaves sublanceolate, dotted, echinate.

The adyseton montanum is a small procumbent plant, of the perennial kind, with hoary leaves curiously embossed with little prominent points, having the summit of its branches about the end of April covered with a profusion of bright yellow flowers, which usually go off without producing any perfect seed.

Through want of seeds, it may be increased without difficulty from cuttings; requires the same treatment as other rare Alpine plants, and is well adapted to decorate the small borders of the flower garden, or any kind of rock work.

ROSA PROVINCIALIS—VAR. α.

POMPONE ROSE.

Icosandria Polygynia.

Rosaleæ.

Gen. Char.—Calyx five-cleft, fleshy; contracted at the neck. Seeds very many, hispid.

Spec. Char.—Leaflets ovate, villous underneath, serratures glandular.

This rose, from its root, throws out numerous stems, which rarely exceed a foot or a foot and a half in height; they are usually straight, rigid, and very prickly; the flowers are smaller than those of any other double rose, generally of the size of those represented on the plate, and particularly distinguished by the brilliant colour of the eye or central petals; a flower of this sort just on the point of expansion is superlatively beautiful.

It requires an open situation, a pure air, and a light soil; is improved by manure, and watering in dry summers.

Its flowers are produced in June, and the plant is increased by suckers, which are not very plentifully produced, nor extend to any length.

The roots should not be divided oftener than once in three years; if the old wood be cut down every year after the plant has done blowing, this rose will throw out more vigorous shoots and blossom more freely.

CALCEOLARIA FOTHERGILLII.

FOTHERGILL'S SLIPPERWORT.
Diandria Monogynia.
Scrophularinæ.

Gen. Char.—Corolla ringent, inflated. Capsule two-celled, two-valved. Calyx four-parted, equal.

Spec. Char.—Leaves spatulate, entire, hairy above. Flower stalks like a scape one-flowered. Stem scarcely an inch high, subdivided at the roots. Leaves opposite, scarcely an inch long. Peduncles terminal, twice as long as the leaves. Segments of the calyx acute. Upper lip of corolla roundish, kidney-form, erect, vaulted, yellow. Lower lip descending dilated, yellow, with red spots. Filaments inserted into the sides of the corolla. Anthers roundish. Stigma thickened, flat.

This plant, of great singularity and beauty, particularly merits a place in the collections of the curious; its principal flowering season is in May, but it will often blossom much later in the summer.

It is not to be had in perfection, nor even preserved, without great attention, joined to a peculiar treatment; several times it has been nearly lost from this country. Mr. Aiton makes it a biennial greenhouse plant; it, no doubt, is one of those plants which are liable to be killed in very severe weather, and therefore it is necessary to keep a pot of it at least, during the winter, either in the greenhouse or a well-secured frame; but the plant will be found to succeed best in the open ground, provided it be planted in bog-earth, in a situation that is moist and moderately shady; with us it has proved perennial.

With care it may be propagated by layers and cuttings, but with most certainty in the former mode; possibly it may be raised from seeds; they ripen here, but are as fine as dust.

VINCA ROSEA.

MADAGASCAR PERIWINKLE.
Pentandria Monogynia.
Apocynea.

Gen. Char.—Calyx five-cleft. Corolla hypocrateriform, plaited at the orifice, with flat segments, truncate at the ends. Filaments at the end, dilated into concave scales. Glands two at base of ovary.

Spec. Char.—Stem erect. Flowers twin, sessile. Leaves ovate, oblong. Stalks two-toothed at the base.

It rises to the height of three or four feet; the branches, which when young are succulent, become ligneous by age. Flowers axillary, solitary, on very short peduncles. Tube long and slender, brim spreading, open, flat, divided into five obtuse segments, which are reflexed at their points; the upper surface of the petal is of a bright crimson or peach colour, their under side pale flesh-colour; those flowers which appear early in the summer produce ripe seeds in the autumn.

The vinca rosea grows naturally in the island of Madagascar, and deserves a place in the stove, because the flowers are very beautiful; and there is a constant succession of them all the summer.

It is propagated by seeds or cuttings in the usual way; unless the summer proves warm, these plants should not be placed abroad, for they will not thrive if they are exposed to cold or wet; therefore, during the summer, they should be placed in an airy glass case, and in winter they must be removed into the stove, where the air is kept to a temperate heat, without which they will not live through the winter in England.

GENISTA LINIFOLIA.

FLAX-LEAVED BROOM.
Diadelphia Decandria.
Leguminosæ.

Gen. Char.—Calyx two-lipped; upper one with two; lower one with three teeth. Vexillum bent backwards from the rest of the flower.

Spec. Char.—Leaves ternate, sessile, silky beneath. Raceme termin. Branches round, furrowed.

The bright yellow flowers, which are abundantly produced on this plant during May and June, joined to the silky appearance of its foliage, has rendered it worthy the notice of most lovers of plants, in whose collections it is now generally found.

It is most successfully propagated by seeds, which usually ripen in this country; it may also be raised from cuttings, but not readily agreeing in this respect with leguminous plants in general.

It is usually kept in the greenhouse; being a native of Spain, it may probably be more hardy than we imagine.

POLYGALA BRACTEOLATA.

SPEAR-LEAVED MILK-WORT.
Diadelphia Octandria.
Polygaleæ.

Gen. Char.—Calyx five-leaved. Leaflets wing-shaped, coloured. Legume obcordate, two-celled.

Spec. Char.—Flowers in racemes. Bracteas three-leaved. Leaves linear, lanceolate. Stem shrubby.

There are four varieties of this plant: the stem is shrubby in all, and the bracteas are remarkable, whence the trivial name.

The spear-leaved milk-wort is a plant of great beauty and singularity; the purple of its flowers is brilliant in the extreme; they appear from May to July: it is increased by cuttings.

BABIANA RUBRO-CYANEA.

RED-BLUE BABIANA.
Triandria Monogynia.
Iridea.

Gen. Char.—Corolla six-parted. Stigma three, spreading. Seeds berried.

Spec. Char.—Leaves oblong, lanceolate, distichous.

Stalk from six to nine inches high, round, villous, leafy. Leaves plaited, villous, very strongly so below. Spatha three-leaved, one large, forming a kind of sheath to the germen, the other two narrower and somewhat shorter on each side of it, all of them villous. Flowers usually three or four. Tube about half an inch in length, dingy purple. Brim divided into five spreading segments, upper part of a fine ultramarine blue on the inside, the lower part the richest crimson, dazzling the eye of the beholder. Filaments three, placed round the pistil. Antheræ yellow above, purple below. Style projecting somewhat beyond the antheræ. Stigma trifid, each segment expanding so as to be nearly flat, and edged with strong hairs.

Red-blue babiana is not less distinguished for the singularity than the brilliancy of its colours. Care must be taken when it comes into flower that it be not too much exposed to the sun, for that will render its beauties of very short duration.

It is propagated by offsets planted in sandy loam.

ŒNOTHERA PURPUREA.

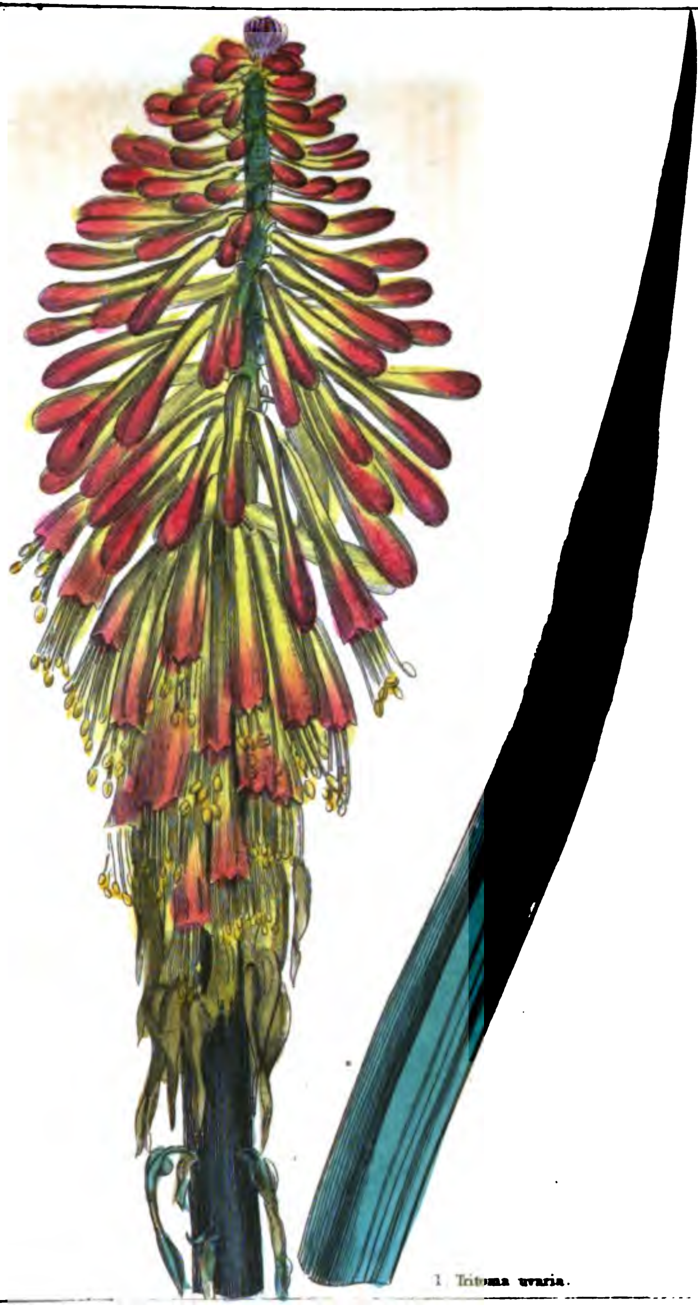
PURPLE ŒNOTHERA.
Octandria Monogynia.
Onagrariæ.

Gen. Char.—Calyx four-fid. Petals four, Capsule cylindrical, inferior. Seed naked.

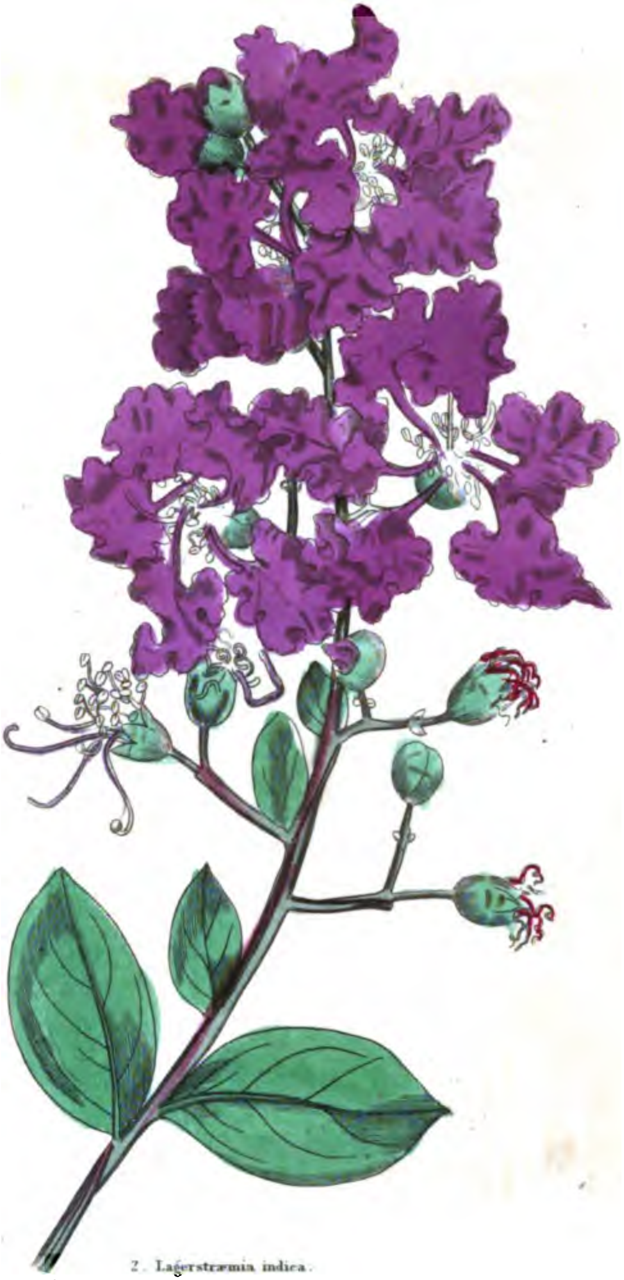
Spec. Char.—Leaves ovate, lanceolate, glaucous, entire. Capsule sessile.

It is distinguished by three principal characters: the glaucous appearance of its foliage, the purple hue of its blossoms, and the dark colour of its stigma.

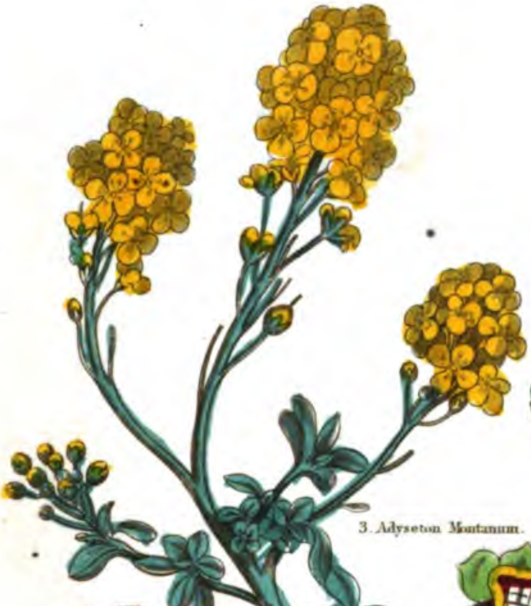
It flowers during the months of July and August, and ripens its seeds in September; is an annual of ready growth, and worthy of being generally introduced to the flower-garden; its seeds should be sown in the spring, with other tender annuals, and the seedlings, when of a proper age, planted out singly in the open border, where they will acquire the height of two feet, and produce abundance of blossoms.



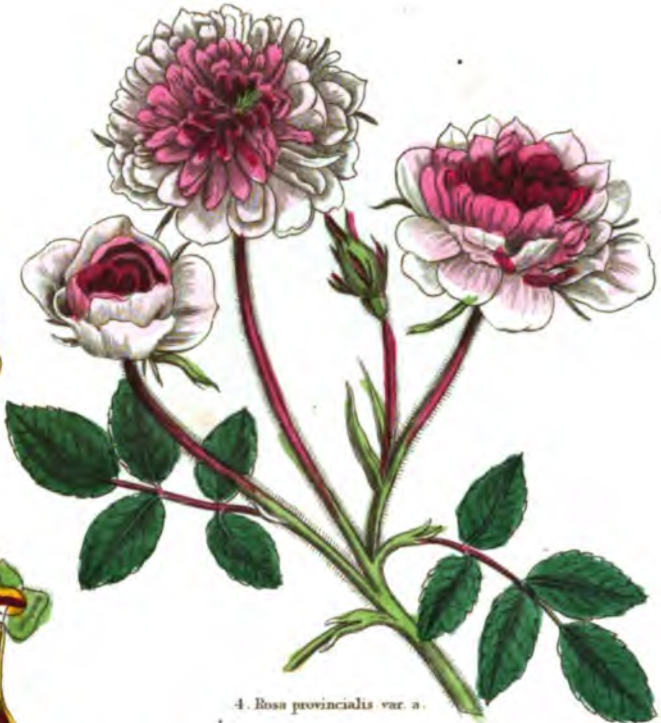
1. Tritoma uvaria.



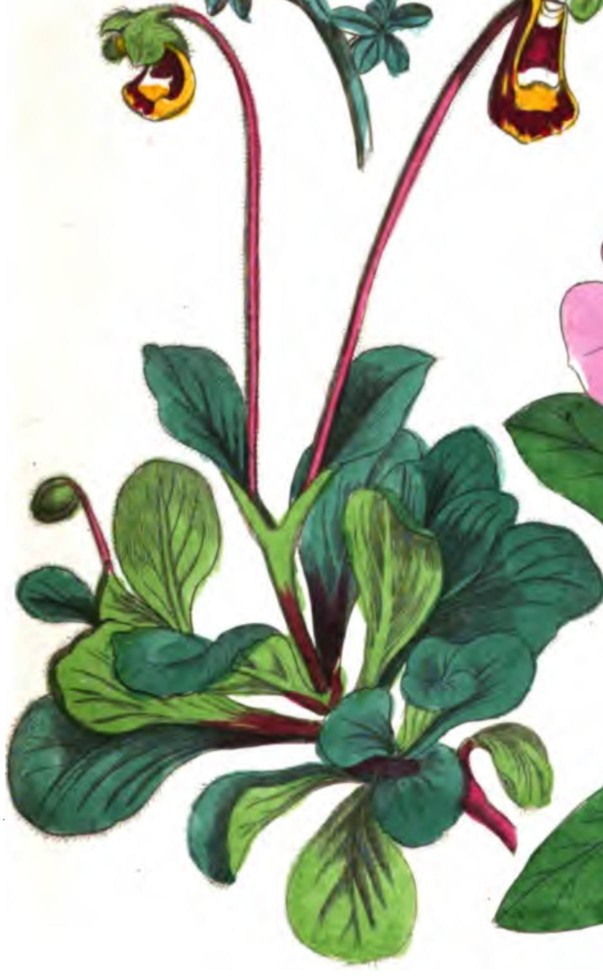
2. Lagerstræmia indica.



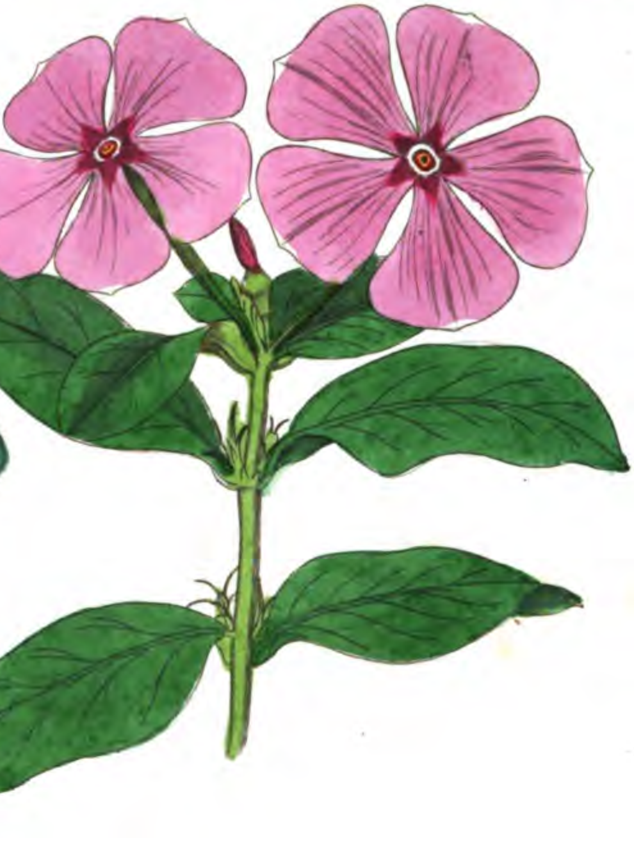
3. Adyseton Montanum.



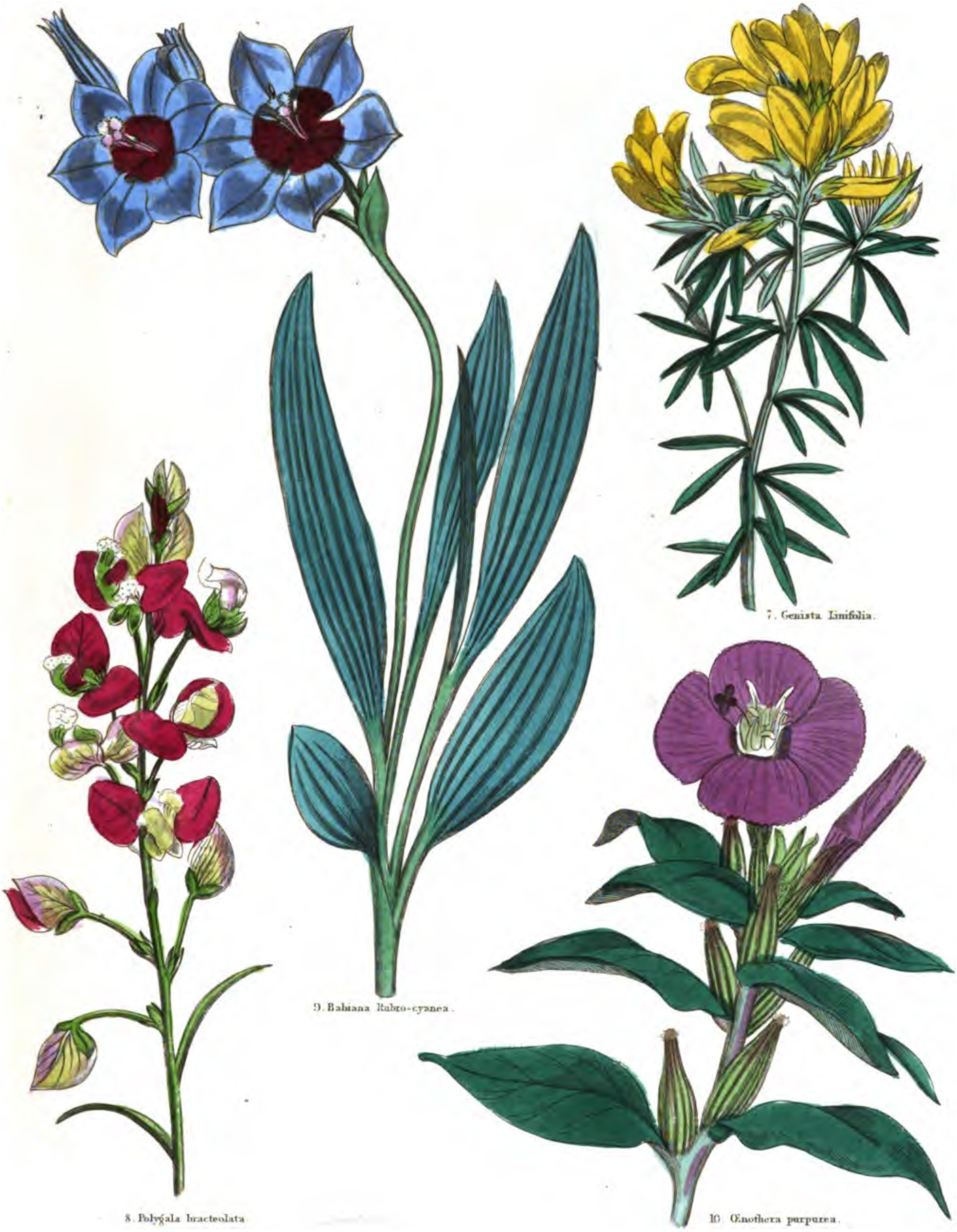
4. Rosa provincialis var. a.



5. Calceolaria Fothergillii.



6. Vinca Rosea.



7. Genista Linifolia.

8. Polygala bracteolata.

9. Babiana Rubro-cyanea.

10. Œnothera purpurea.

THE
MAGAZINE OF BOTANY, GARDENING,
AND
AGRICULTURE,
BRITISH AND FOREIGN.

MAY, 1836.

ON THE TURNIP FLY.

At this season, when that destructive insect the Turnip Fly begins to make its appearance, it may be useful for our farmers to know something of its nature and the means that could be adopted to lessen the injury resulting from its attacks. The following observations are selected from a report of the Doncaster Agricultural Association on the subject; it is arranged under twelve heads of inquiry, viz.:—

"1. In what sort of weather have you generally observed the fly do most mischief to the turnips?

"2. At how early a period of the year have you ever known the fly begin to attack the young turnip plants?

"3. Is there any period of the year after which you have never known the fly to attack the young turnip plants?

"4. Have you known instances where the fly has attacked turnips after they have put out the rough leaf?

"5. When this was the case, were there any peculiarities in the season or weather?

"6. Have you observed, that the fly was more destructive on one kind of soil than on another? State the soil on which it has been most destructive.

"7. Have you observed, that the nature of the manure used has tended to increase or diminish the injury done by the fly? State the nature of the manure which you think tends most to diminish the attacks of the fly.

"8. Have you observed the fly to be more prevalent in broadcast, than in drilled turnips, or the reverse?

"9. Have you ever tried any method to prevent, or to cure the damage done by the fly? State what, and the result.

"10. Have you ever made any observations as to the mode in which the turnip fly is generated? State what these observations have led to.

"11. Is it your opinion that the fly is more prevalent now than it used to be? If so, can you account for this, and how?

"12. State any general observations you may wish on the subject.

"Upon the first head of inquiry—as to the seasons in which the depredations of the fly occur—it appears that the greater number of correspondents state the months of May and June as the period of the first attack. It is, however, generally added, that their appearance occurs as soon as the turnip plant itself appears; and many correspondents have observed the insect upon the crops in April, whilst four correspondents have observed them in the gardens as early as March, upon garden sown turnips and cabbage plants. From the whole of the answers it is certain, that, as soon as it is possible to sow field turnips with advantage, the fly is ready to attack them, and the possibility of sowing, so as to precede the appearance of the fly is decisively negatived. Upon the expediency of early sowing with reference to the fly, some maintain from observation, that the earlier crops have generally escaped better than later sown; whilst others as strongly object to it, stating their experience to lead them not to sow by any means before Midsummer. One instance of the latter class in particular, is given as the experience of an old turnip seedsman, 'that he had always observed for many years, that those who sowed before Midsummer, were his best customers, generally coming for a second supply.' The advocates of early sowing contend for it upon the principle that the fly is not so vigorous before the hot weather commences, and the plant has therefore a better chance of growing out of the way. It must, however, be remembered, that if, from the coolness of the weather, the fly is less vigorous, the same circumstances make the growth of the plant less vigorous also. It is also alleged that sowing, before Midsummer, is detrimental to the general growth of the crop, as it respects its preservation through the winter.

"As to the latest period in which the fly is observed in activity, there is a concurrence of opinion sufficient to establish the fact, that no period is too late, provided the weather continue warm. Several instances are given of the plant being destroyed, when sown late in August, and one of a crop being destroyed after the middle of September. Either of these periods is obviously too late for general sowing; and the idea of waiting until the season of the fly is over, before the turnip seed is put in the ground, is shown to be fallacious. Many correspondents allege that the fly is weaker in July; and it is consistent with our general observation upon insects, that, as the season advances, their activity declines; but this must be so entirely dependant upon the weather and season, that no practical rule can be deduced from such an observation.

"The season, therefore, properly belonging to the turnip fly may be said to coincide with the season of vegetation itself. The observations of those correspondents, who have paid more particular attention to the habits of the insect, entirely support the more cursory observations of the farmer;—they, with one accord, allege that the fly may be procured at all seasons, during which insects are generally at large. A remarkable instance is given by Mr. Henderson of the readiness with which the insect avails itself of the first approaches of Spring, to venture out of its hiding place. He states, 'On the 7th of April, I observed a great number of the turnip fly floating on the water in a cart track on the outside of a wood near this place (Milton.) The track lay a few yards from the edge of the wood, in a grass field adjoining; the morning was very fine, which no doubt had enticed the insects to leave the wood; but, either through inability to take a longer flight, or being blown down by the wind, they were floating in great numbers in the water and mud of the cart ruts. Almost all their elytræ were raised, and their wings expanded; which left no doubt of their having been flying. On the evening of the same day, I observed great numbers, which had fallen in a similar way, floating on the water in a pond in the Park.

"On the second inquiry—as to the stage of growth of the plant, in which it is subjected to the attacks of the fly—the information is nearly unanimous. It is well known that as soon as the turnip plant appears, and puts out the two first leaves, called the cotyledon leaves, it is immediately attacked by the insect; and, either by devouring these leaves, or the heart of the plant which developes the succeeding leaf, (or rough leaf,) it is generally destroyed. The smallness of the plant, and the extreme delicacy of its bud, leave it peculiarly exposed. It is, however, a general opinion, that after the second series of leaves, commonly called the rough leaf, are developed by the plant, that the insect will no longer attack it. This latter opinion is, however, unfounded. The correspondents, almost invariably state, that the insect continues its attack, and even commences its attack, though the rough leaf has appeared; but, that the rapid growth of the plant seldom fails, notwithstanding its aggressors, to insure its being brought to a crop. A few instances are stated of great damage, and even destruction at this stage; but the danger is by no means great. The difference in the state of the plant, when strengthened by the rough leaf, compared with its state in its first leaf, is sufficient to account for the general opinion so widely entertained, that when the plant is in its rough leaf it is safe. It is ascertained from satisfactory observation, that the fly continues upon the turnip throughout the whole period of its growth; not being exclusively confined to this plant, but taking it in common with other plants.

"The third head of inquiry was—how far the depredations of the insect were dependant upon the weather. The opinion of the great majority of correspondents is, that the fly is most to be dreaded in hot weather. There are a few exceptions, who state it as their observation, that it is most destructive in cold weather:—an apparent contradiction, which, however, on consideration, may not be found so flagrant as at the first view it appears. Another circumstance in the weather is noticed by the greater part—that the weather most dreaded was gleamy or showery:—with some correspondents it is added, 'showery after a season of drought.' With others, the showers are described as thunder showers. It appears, at first view, extraordinary, that showery weather, or mixed heat and rain—when it is supposed the growth of the plant will be quickest—should be found the most fatal season. On reflection, however, we shall see that the summer showers, occurring in the latter part of May, June, and beginning of July, followed by hot sunshine, are not at all assimilated to the showers of April, or spring. The earlier spring showers are known to be the great promoters of the growth of vegetation: the summer showers on the contrary, being generally thunder showers, are too heavy for the turnip fallow; and, instead of gradually moistening the land, and hastening the vegetation of the seed, are found, when followed by the hot sun-shine of that season, to set, or run together the surface of the land, so as to impede the bursting through of the young plant; or, if it has already vegetated, impeding its growth. Whenever, from such a cause, the growth is impeded, the plant is longer left at the mercy of the insect; which the sultry atmosphere, attending such a season, quickens into more vigorous activity. The same obstruction of growth may proceed from a directly opposite state of weather. If cold or wet should come, with intervals of sufficient warmth to allow the insect to feed; though its activity would be less, the plant would be longer exposed, and in the end, might fall a prey to its devourer. It is apparent, from what has been before deduced upon the season of appearance of the turnip fly, that a slight degree of cold will by no means destroy it; and it may be, that what retards the growth of the plant, does not render torpid the insect; or it may be, that the cold of a night may seriously check the growth, whilst the insect, concealing itself during the night, may come forth in the warmth of the day to its work of mischief. It is stated, that in windy weather the fly is not injurious, not being able to bear exposure to the wind.

"With regard to soils, the fourth head of inquiry was—whether any of the varieties, with which this country abounds, are safe from the visits of the insect. On this point the correspondents agree, that no soils whatever, on which turnips can be cultivated at all, are safe from its natural enemy. On strong lands as well as light lands, on hot soils as well as cold, the turnip fly will be found. A strong difference of opinion is expressed, whether it equally abounds upon all; some contending that the stronger soils, which are less congenial to the growth of the turnip, are most liable to attack: whilst others assert, that the lighter and proper turnip lands, being dry and more adapted for the habitation of the insect, are necessarily most annoyed. A key is, however, given by both classes, which will sufficiently open their difficulties. They agree that where the growth of the plant is slowest, the danger from the insect is most serious; and any circumstances of soil, which retard the growth, increase comparatively the danger. Poor soils, without distinction of wet or dry, are alleged to be peculiarly exposed. It is difficult to say—judging from the contents of our returns—whether the insect abounds most on strong soils or lighter; but it may answer our purpose sufficiently to know, that it is found destructive upon both: that no soil therefore is safe.

"On the fifth head of inquiry—how far the use of particular manure may affect the appearance of the insect—it seems to be ascertained, that no manure at present known, will prevent its approach; but that, whatever manure may be used, the fly will not avoid it. Apparently dwelling upon this fact, many of the correspondents assert, that it makes no difference what manure is used; but the observation of others—and by far the greater number—brings them to the conclusion, that whatever manure most effectually promotes the growth of the plant, that will, at the same time, be the most effectual defence from the insect. It is obvious that different soils require different kinds of manure; but the object to be aimed at is, so to adapt the manure to the soil, as will ensure most rapid growth of the young plant. The majority is in favour of well rotted yard manure, or stable manure; and many concur in conceiving that long manure tends to increase the ravages of the fly. Drilled bone dust, pigeon dung, and vegetable ashes drilled, are also recommended as capable of being more immediately laid in contact with the seed; composts of manure and earth, bones and ashes—as promoting speedy growth. It is evident that the young plant, unless placed in immediate contact, will not be benefited by any dressing of manure until it is out of danger from the fly; or unless the earth in which it lies has been sufficiently long upon the manure to have become enriched by it. At the same time, most manures applied to fallows, are applied in such a state of fermentation as to check rather than promote the growth of any plant which vegetates in the midst of it. The plan to be aimed at seems to be, to procure such a slight covering of earth upon the manure, as will immediately feel the fertilizing effect, and that the seed should be deposited in that soil; and, whilst it feels the benefit, should thus be protected from the too great heat of fermentation. This may, probably be more regularly insured, by the use of a manure which will pass through the drill; but where manures of other kinds are used, the system of ridging, and drilling in the seed, will, in a measure, answer the purpose. If it were possible to provide composts in a sufficient quantity, there is no reasonable doubt but they would be preferable to all other methods of manuring; the degree of heat in composts, in a proper state for use, not being so great as to retard the growth of the plant, whilst every benefit of fertilization is obtained. A few correspondents recommend the manure to be put in the preceding autumn, or as early as January or February; but, even were it found extensively beneficial in its effect, the difficulties of such a course would be too great to allow it to be generally practised. One method of manuring has alone been found nearly a preventive to the fly—and this is, paring and burning: but this course would be destructive upon sandy soils, and could be rarely practised regularly upon any. As a method of bringing strong or peaty grass land into plough, it is very beneficially used; but it cannot enter into any regular course of management with advantage. Mr. Smith Edwards states, 'In 1827 I sowed two fields with turnips, the soil and situation the same; the one after a very clean crop of wheat, the other after a foul crop. Both were manured and cultivated the same, except the extra trouble of getting the foul land clean, and burning the weeds. The latter produced an excellent crop from the first sowing, the other entirely failed, though sown three times. I have seen many similar instances, and never failed to get a good crop of turnips after burning weeds or turf on the land for the turnip crop.' Mr. Boy says, 'Ashes procured from digging the sides of highways, or from paring and burning, are an almost certain preventive of the fly, if properly managed.' Another method of manuring has been generally safe from the fly, though it is one which cannot be generally practised, and this is, sheepfolding the fallow. Mr. John Dent says, 'It used to be the practice in this neighbourhood formerly to fold for turnips, i. e. to pen a number of sheep on a certain portion of the turnip fallow, every night moving them to a fresh place, till the whole was gone over. My father, who has been a turnip grower upwards of half a century, says, he never knew the fly injure turnips after the fold.' Mr. Yeoman states, 'I think the manure made with sheep is the best to prevent the attack of the fly; as I remember, one year in particular, I folded my sheep upon some land that was for turnips, and on that part of the field I had excellent turnips, whilst on the other part they were destroyed.' Upon what principle this is brought about it is difficult to say; whether the soil, by folding, becomes more moist, and more adapted to the quick growth of the plant; or whether there may be something left in the soil from the folding, which keeps off the insect. Folding is, however, considered injurious to the animal, and the present very general abandonment of the custom shows it is not, in other respects, advantageous.

" As to the benefits with reference to the turnip fly, arising from particular methods of cultivation—which comprises our sixth head of inquiry—something is necessary to be said. It was made a distinct question in our Circulars, whether the broadcast or drill system was most safe from the fly, and the answers have been, what might have been anticipated, most overwhelmingly in favour of the drill system. It is preferred as bringing the plant more immediately into contact with the manure used—as forcing forward the plant, from the thickness in which they stand in the rows—and as affording a more convenient field for applying remedies when the crop is attacked. The advantages of the drill system will be more apparent when all the circumstances of the turnip fly are considered, as about to be detailed; but it is of itself a very striking fact, that in parts of Scotland where the drill system is more extensively adopted, the ravages of the fly have become so scarce as to be almost forgotten.

" On the importance of general good management, Mr. Chamberlain's remarks are very pertinent. 'In my opinion, the best way to prevent the fly taking the turnip is, to make a good clean fallow, and not let any weeds remain thereon; the last two or three weeks before sowing your turnips—to spread the lime early and mix it well with the soil—dung it well with good rotten manure, to force the plant—procure good seed, and sow it immediately after the plough.' Mr. Armitage Rhodes's suggestions are also excellent: 'The best mode of prevention appears to be, clean and perfect fallow—not too frequent cropping with turnips, but varying with mangel-wurtzel, tares, red clover, and other crop, adapted, if possible, to the wants and soil—frequent previous stirring—the destruction of weeds in the hedgerows and adjacent lands—abundance of manure well suited to the soil, not having more than three, at the utmost, in the shortest rows, five rows open at a time in putting in manure, earthing up as soon as the rows are manured—sowing instantly, not less than four pounds of seed per acre, divided at twenty-seven inches between the rows—the plant, in dry seasons, pressed down as soon as it appears, so as to let the tap root touch the manure—an immediate top dressing of soot or other fertilizing substance—not hoeing, but to suffer the plants to remain thick in the row longer than usual, so as to afford abundance of food for the fly, to retain moisture, and accelerate growth.

" The majority of our correspondents dwell much upon the importance of regular management, and a high state of cultivation, as more than any other thing ensuring regular success in the growth of turnips. Apart from any theory, it is obvious that experience must have led to this observation; and, by whatsoever theory we may explain it, it stands as a fact, established upon long continued observation, that lands in the best condition generally escape best. It is also consonant with all other information we have obtained:—we have seen that the rapid growth of the young turnip is the object at which the farmer should aim, and nothing can so much ensure this, as regular, good management. We shall find, in pursuing our inquiries, that the turnip fly is fed upon many weeds, and shelters itself in hedges and rough grounds; and nothing would tend so effectually towards destroying it, as early clearing off both its shelter and its food, as far as possible. On highly cultivated lands, the growth will be quicker, and the insect fewer, and there can be no doubt that such a system as will most effectually clean the land, and keep it in heart for its crop, is the best regular preparation against the turnip fly.

" It now only remains for us to report upon the various plans and expedients which have been brought before us, as preventing or alleviating the attack of the insect.

" The first train of preventives is in the methods of dealing with the seed previous to sowing, or guarding against the disease as springing from the seed. Steeping the seed in oil, in brine, or in brimstone, are all mentioned. For this course, two reasons are given quite independent in their bearing:—one that steeping destroys the egg supposed to be lodged on the seed; the other, that it imparts a disagreeable odour or taste to the plant, so that the insect has no relish for it. Mr. James Fowler says, 'The seed I steep in milk twenty-four, thirty-six, or forty hours, putting to each pint of seed, one spoonful of liver of brimstone; which must be put in directly the seed is made all wet with the milk: it requires about three or four table spoonsful of milk to a pint of seed. You may mix a second time, if it should get dry, and endeavour to let it penetrate through the rind before it is sown. I have tried it two years, and scarce had a turnip touched, while I have sown them unprepared and had them eaten like scrubs.' With regard to all such experiments, we may say, we have not found any one in particular so generally recommended to us upon the test of experience, as to warrant our relying upon it. That the first principle on which they are adopted, is of any force, seems more than problematical; and no dependance can be placed on it, until it is ascertained that the egg is on the seed to be destroyed. The second principle is reasonable in itself, provided something can be found which, without injuring the seed, will nauseate the fly. There is no doubt, from observance of the principles of vegetation, that the young plant does imbibe the quality of any fluid which is in contact with it; and if some liquid can be found, of which the small quantity, which the seed will imbibe, will be sufficient to taint the young plant, the purpose will be answered. It is only the first growth which is in danger; and, impossible as it would be, to affect the after growth, it may be possible in the early growth, and is a fair field for experiment. At present, however, it is altogether experiment; and, whilst we may desire not to discourage it, we cannot venture to say, it is at present at all near to a favourable issue.

" Mr. Sutton's plan is next in order, as connected with the seed of the plant; and this has been before explained. It seems to be adopted, and pretty extensively acted upon, and in many cases to be successful. It is open, however, to many objections, beyond those which are made on account of its frequent failures. Whilst the land is lying still, the weeds grow; and, as Mr. Dent observes, the land may be filled with weeds before the seed is up. Mr. Smith Edwards and Mr. Bayldon also state distinctly their trial of the plan, and its failure. Mr. Smythies says, 'I tried Mr. Sutton's plan of drilling them on a stale furrow—he revealed his secret to me before he made it public, and I gave it a trial, on twelve acres, which completely failed, though some sown on the same day, on a fresh furrow, were not touched.' Mr. Hughes recommends the plan; and Mr. Shield says, 'I am convinced, from repeated trials, which is experience, that, if the land is manured, and prepared ready for sowing, and left unsown ten days or a fortnight, the turnip is in no danger from the fly, let the soil be what it will.' The principle of the plan seems also to have been adopted at Arbroath, whence Mr. Bowie writes :—'The land being well prepared, about the 1st of June the dung is spread on the surface, and immediately ploughed, harrowed, and rolled; in ten days after the manure has become well incorporated with the land, we drill and sow. We allow twenty cubic yards of the dung to the acre.' Mr. Walter Long, however, observes, 'Mr. Sutton's plan is too tedious for an agriculturist, on an extensive scale, to pursue;' and as Mr. Stephenson adds, 'few seasons will suit it.' The objection to it on the score of its increasing the growth of weeds, is, on many soils, so serious, as entirely to prohibit it; on other soils this difficulty may not occur. It also lies open to the objection of tediousness; as it is too frequently the case, that the turnip fallow is not ready sooner than the period for sowing; and, in such cases, the farmer cannot allow it to lie the specified fortnight, but must sow immediately. A still more serious objection to the plan occurs, from a general principle of husbandry, that newly stirred land promotes vegetation far more vigorously than stale land—much of the failure so frequently arising from a second sowing, is to be attributed to this fact. On this head Mr. Goodman observes, that 'after the manure (well rotted and ploughed in, and harrowed) has become well mixed with the soil, if the weather appears growing, plough the land again, and sow or drill in the seed immediately. In case the fly takes off the crop, there will be a chance of sowing again; but I think it is of little use to sow a second time, unless the land is fresh ploughed.' Mr. Morrison, agent to Sir Evan M'Gregor, states, 'I have observed, these many years past, a very material difference in the vegetation of turnips, when the seed was got deposited immediately after the plough in drilling, compared with those seeds which may not have been got in for a day or two after the drills had been made up. They come away much more puny and less vigorous in the latter case, and are eight or ten days later in coming to the hoe. Much of the success in turnips depends upon the rapidity of the operation in getting in the dung and seed.' The experience of Mr. Smythies, as to the success of the fresh furrow, whilst Mr. Sutton's plan on the same day failed, may be attributed to the same fact, of the superiority of fresh stirred earth, in promoting vegetation. This is, indeed, a principle too well known, and too firmly established, on long experience, and on observation of the general laws of husbandry, ever reasonably to be doubted. At the same time, the principle, however good, must not be abused so far as to lead a farmer to ridge up his land after a very dry fallowing season, and to sow his seed on ridges of dust, into which the rain, even if it comes, must be long before it can fully enter. On this head Mr. Neale speaks strongly, although we may not be disposed to concur in the whole of his reasons. He says, 'One observation, in particular, I think worthy of notice; and it cannot, in my opinion, become sufficiently known. I mean, that land designed for turnips, should remain undisturbed for the last ten days or a fortnight at least, previously to being ploughed for receiving the seed. It is quite astonishing how much this does towards insuring a crop. The mould having been kept moist during the time named, the seed immediately vegetates, and gets out of the way of the fly: whereas, when the land has been constantly stirred up to the time of sowing, in seasons at all dry, the mould (and more particularly on ridges where that system is in use) has become almost like dust, the consequence is, that that portion of the seed only which is deposited deepest, grows; whilst the other, in the dry mould, does not vegetate until a sufficient quantity of rain falls to moisten it. The reason of the failure of a crop in such a case, if the fly attacks it, is obvious; the plants being thin, are very soon all eaten; whereas, had the contrary mode been adopted, and the seed been thickly sown at a regular depth in the drill, with an ample quantity of manure beneath, the healthy and vigorous state of the plant would bid defiance to the fly in almost every instance.'

"It will be observed, Mr. Neale's system is not Mr. Sutton's plan, though, in one point, the same. Mr. Neale ploughs his land and sows immediately, which, upon Mr. Sutton's theory, would vivify abundance of insects. Mr. Neale thus secures fresh stirred land for his seed; and this being secured, his previous plan of suffering the fallow to lie ten days, may be serviceable in the view he takes of it. At the same time, we shall see this depends entirely on seasons; in a dry season it is desirable, as allowing time for imbibing moisture; in a wet one it is impossible, from want of time, and unnecessary, from abundance of moisture. In all cases ridging the land in a very dry state, and sowing in a very dry state, are to be avoided. We may, by the way, suggest, whether Mr. Sutton's plan is not mainly indebted, for its actual measure of success, to the principle pointed out by Mr. Neale, rather than to the principle upon which its author founded it; but whatever conclusion we may form on this head, we shall see enough before us to warrant our deciding that Mr. Sutton's plan is not such as can be safely recommended or relied upon, however it may have led us to the knowledge of the advantages of getting the working of the fallow completed, wherever practicable, some days before ridging for the seed.

"The second train of preventives is found in the manner of putting the seed into the ground. It need scarcely be remarked, after what has been said on drilling, that this method of depositing the seed is far to be preferred to sowing broadcast. For the reasons before given, broadcast is so far inferior, that it ought never to be adopted where the drill can be used. The system of ridging for the drill should also be used, wherever practicable. In our Report, in several instances, drilling upon the flat is recommended; and in very dry seasons, where, for particular reasons, the sowing cannot be postponed, rather than ridge the mould in its dry dusty state, it may be well to flatten the ridges; but, whether flat or ridged, the manure should always be placed under the drill, and in no case, and under no circumstances, should this be omitted. Another important point is, the quantity of seed to be sown or drilled. There is in our Report, a strong and uncontradicted persuasion, founded on experience, that it is highly expedient to sow a large quantity of seed. Whilst half a pound drilled is sufficient to produce the plants which would be wanted, supposing there was no turnip fly; three or even four pounds are recommended, with a view to produce such a mass of plants as shall feed the fly, and leave a crop for the farmer. Six or seven pounds are also recommended for broadcast. Of all the expedients we find recommended, this is the most simple, the cheapest, and, as far as it goes, the most effectual. It has also the advantage of being quite compatible with many, and, indeed, every other means of prevention. Upon this head, therefore, there cannot be two opinions; every farmer should sow plentifully of seed, and, if he errs at all, let it not be by sowing too little.

"As to the kind of seed, some correspondents recommend seed of one year only, as vegetating at the same time, whilst others distinctly state their preference for seed of different years, because vegetating at different times, that if one part is taken, another may escape. The information we have obtained on the natural history of the insect, shews clearly the first opinion to be safest; and that to use seed of different years would, in fact, be the most likely course to have the whole destroyed. As the insect is not the creature of a few days or weeks, when the vegetation of the first growth was devoured, the fly would still be ready for the following growth; and, in fact, the successive vegetation would provide it with a succession of food just fast enough to be all consumed. The only advantage attending the latter plan, would seem to be the possibility of a change of weather during the successive vegetation. This, however, is obviously too uncertain to be of much value

"Another expedient connected with the seed, is the sowing together with, or near to the turnip seed, some other seeds, the plant from which possesses more attraction for the insect than the turnip itself. One of our correspondents, Mr. Balydon, states, that when Swede turnips and white were sown together, he found the fly always took the white, and left the Swedes; a fact which, if confirmed by further experience, suggests the simple remedy of sowing or drilling white turnips in the spaces between the ridges on which the Swedes are sown, and thus feeding the fly on the white, until the Swedes are out of danger, when the white may readily be hoed up. It has been suggested that the fly prefers the common or wild radish to the turnip plant, but this has not been proved. Mr. Oaken tried it, but unsuccessfully. With the exception above stated, we have, in our returns, no practical application of this principle; and all we can at present say upon it is, that it is a fair field for inquiry and experiment. The plant upon which it feeds should be tried as sown with the turnip, and different kinds of turnips sown together; it may be that some one or more may be found which might be sown at the same time, and employ the fly until the turnip chosen for the crop is out of danger. Mr. Birks mentions a fact which is an encouragement to pursue such inquiries:—'A few years ago, Mr. Townend, of Ellerthorpe, had two fields of turnips; one the white top, the other the red turnip; the fly attacked the white top, and destroyed the crop, while the red turnips were not at all injured; the fields adjoined each other, and both were managed and manured in the same way. When this was mentioned to an intelligent farmer, he observed, that the red turnip is so much inferior to the white top, that neither fly nor cattle would touch the red while there were any other turnips to eat.' Mr. Birks adds, 'It may, however, be of use, where the fly is prevalent early in spring, for the farmer, when he sows his later crops, to mix a proportion of the red turnip seed, so that if the white top be destroyed, what may be a moderate crop of the red turnip may remain.'

"The third train of preventives relate to methods taken after the fly has commenced its ravages. The first to be mentioned may be hoeing and rolling; both of which, as far as they may be calculated to promote the speedier growth of the plant, are advantageous; but as to the destruction of the fly, they must be wholly inefficient. Another expedient has been the procuring a board, newly painted or tarred, to be drawn over the field; when the insect, jumping up at its approach, is caught in the paint or tar and destroyed. Another is, the drawing over the field the branches of the elder tree, by which the insect is supposed to be annoyed, and to make its retreat from the smell, to which it is assumed to have a serious objection. These have both so much of the appearance of quackery, and are so little proved either on principle or experience, that they must be left among the amusements of the amateur. A more efficient course is taken by fumigation, and where this can be practised by burning stubble, or weeds, or other things, on the windward side of the field, when the smoke will draw down to the ground, it has been found to answer: but the difficulties in accomplishing it are also too great to allow its general adoption. A very beneficial remedy is found in spreading vegetable ashes over the plant when wet with the dew; and the same may be said of soot; these may be spread by hand or by machine, and if they are repeated as often as the plant, from showers or otherwise, becomes cleared, they are generally found much to stay the fly's ravages. The object is to cover and surround the plant, so as to injure and keep of the fly; and, so that the quantity used is not such as to injure the plant, the more frequently repeated the more effectual has it been found.

"Mr. Bayldon has very systematically practised watering the turnip plant, and with considerable success. He states, 'the year 1829 was, for Swede turnips, both uncommonly droughty, and full of fly; which obliged us to invent a water-barrel-machine, and with perseverance in making use of it, we obtained a good crop of Swedes. In watering some rows more freely than others, we were enabled easily to judge that the most watered not only grew with more vigour, but that the flies appeared upon those rows to have received a greater check than upon the rows more slightly watered.' This doubtless is a natural remedy for the disease, provided it can be so managed, as to labour and expense, as to fall within the compass of the farmer's establishment. In point of mechanical contrivance, nothing can be easier than to make a machine to water three or four rows of plants at once; as it would be only altering slightly the delivering pipe of a common street water-cart. Indeed, at a trifling expense, a common barrel may be adapted to the purpose. The subject is one of considerable interest, and we add Mr. Bayldon's estimates of the labour and expense: 'The water barrel contained one hundred and eleven gallons, and with a man, a boy, and one horse, we watered four acres of Swedes and mangel-wurtzel per day. Water being at each end of the field, they managed to fill and empty twelve barrels per day; the rows being twenty-two inches apart, it allowed about two and a quarter pints to each rood of seven yards—four rows were watered at once—we watered eight acres three times over in one week. The watering must be continued every other day, and with four, five, or six times watering, there is no doubt of a good crop. For the expense, say five times, man three shillings, boy one shilling, horse three shillings, and wear and tear of machine five shillings, altogether makes twelve shillings per day; the watering of four acres leaves the expense three shillings per acre; and this five times over, makes the total expense fifteen shillings per acre.' This expense is certainly nothing to be put in comparison with the loss of a turnip crop. There will be situations more or less convenient for watering; and, wherever practicable, it is a method which deserves attention and trial; not so much for destroying the fly, as for forwarding the plants in their growth out of the way. It must however be borne in mind, that a single watering, even if it be so effected as to sweep the whole surface, is not sufficient. It must be repeated; and, after all repetitions, if the fly is very numerous, as the watering only checks and does not destroy it, the crop may fall a prey. A peculiar instance is given by Mr. Neale. 'In the year 1826, I had a field, about nine acres, sown about the first week in June, with rape broad cast. In a few days after the plants came up, the fly attacked them. The field being in such a situation as allowed of its being irrigated, I immediately decided to flow the water gently over it, and superintended the operation myself. I witnessed the destruction of thousands of these insects, and supposed, after the water had been on three hours, and, of course, the land completely saturated, that the whole race of insects in that field must have been annihilated. This did not prove to be the fact, for the very next day the plants were again completely covered with the fly, and it ended in the total loss of that crop. Afterwards, however, I had the land ridged and sown with turnips, and succeeded in getting a very heavy crop; probably from the effects of the irrigation, for all the high land was so affected by drought, and subjected to fly, that many crops, on good turnip land, failed altogether.'

"The last remedy we have recommended to us, is one which is more universally practised than any we have yet touched upon, and seems capable of more general use, as well as being comparatively much more certain of success. It is to spread quick lime over the young plant as soon as out of the ground—to spread it on and around the plant, and to repeat it as often as wind or rain shall have cleared it off, until the plant be out of danger. We have not found an unvarying concurrence in the success of this plan; but, considering how much depends upon the time and manner of applying the lime, and the necessity for watchfulness in its repetition, we shall not be discouraged by partial failures. Lime is so common it can be had in all situations; and it is so cheap, that the cost need not at all embarrass the farmer. The labour in applying it, is so comparatively small, that it is capable of being generally adopted. If the fly should not appear, the lime can be used for other purposes, and no loss, beyond the labour of carriage, will be incurred. Mr. Walter Long states, 'I have sown riddled lime at the rate of six to eight bushels per acre over a drilled crop, and eight to ten over a broadcast, with a machine of my own construction. I have never failed to prevent the ravages of the fly, so as to secure a good plant, by this method of liming. My time for sowing the lime is as soon as sufficient plants for the crop are up.' Mr. Vevers says, 'I have saved my turnips for many successive years, (with one exception,) by sowing hot lime or soot along the drills, immediately on the plant being attacked, and repeating it as often as required. I think if a machine were made that would dust the plants regularly and quickly, when they are attacked by the fly, that they may always be saved; but it must be done as often as wet or windy weather beats it off. I have had occasion to repeat it four or five times in the season, by hand.' Mr. Smith Edwards says, 'I have tried weed ashes, soot, and quick lime; all of which I consider very beneficial; but as the two former cannot, in general, be had in sufficient quantities, we use lime. If the turnips are drilled, the process of using lime is very easy, by putting hot or quick lime in a box, with a hole in the bottom of the box, and a round stick with nails in it, made to filter the lime out. A man will dress four or five acres per day. Upon broadcast the lime is sown by hand. If it rains, the lime directly loses its virtue, and should be repeated as often as this occurs.' Mr. Birk's plan for drilled turnips is particularly good. 'As I have (he writes) saved my crop for several years, by means of quick lime, I will state, more particularly, how it was applied. The turnips were drilled on ridges. The first time I tried the experiment I happened to have a cart load of lime, which had been slacked and laid up under cover several months. We observed the fly in great numbers upon the turnips, which were just in seed leaf. Early in the morning, while there was a strong dew, this lime was spread by the hand on each ridge, so as to completely cover it, but as thinly as possible; the lime killed by far the greater number of the insects, but *did not at all injure the plants.* We then got other lime, (Warmsworth lime, which is a magnesian limestone,) fresh from the kiln—it was slacked and used the day following in the same way. It had the same effect, and *did not at all injure the plants.* I admit, several farmers have informed me, they have used lime without effect, and I can only suppose that, for fear of the plants being burnt up by the hot lime, they have used too little. From experience, I can say, that by making the row completely white over with the hot lime, early in the morning, as above stated, my own turnips have been saved from destruction, for several different years. As near as I can tell, a chaldron of lime will spread sufficiently over the ridges of two acres of turnip ground. It would not be so practicable to spread lime evenly and carefully by hand, over a close of turnips sowed broadcast.'

"On broadcast turnips, Mr. Shirley Perkins's plan is as follows: He says, 'For many years I have preserved my turnip crops from the attacks and consequent destruction of the fly, by taking care to have a load of lime ready to slack with cold water, the very first morning the young plants begin to show themselves coming up. A heap of lime, unslacked, is placed at the end of every acre; the heap consisting of about eight bushels. As soon as the young plants can be seen, I order the heap to be slacked with cold water, by which means it becomes excessively hot. In that hot state, either skuttles, large baskets, or wooden hoppers, are filled with this very hot lime, and the farming men (being prepared with gloves, which I give them to protect their hands from being burnt or blistered) begin the process, by spreading the hot lime across the lands, walking backwards, and taking care that the wind carries the lime from them; stooping down in the act of working, to strew the lime as nearly as possible to the soil and plant. My men have used a piece of gauze or crape over their eyes, to guard against any inflammation of the eye, from the small particles of the lime getting into them. The men take it out by handsfull, and so spread it; and sometimes they shake it, with good effect, out of the skuttles or baskets. By this means, this year, (1830), my crops, chiefly Swede, (a small quantity being white,) are as good as could be wished; whilst my garden turnips, which were not dressed with hot slacked lime, were totally devoured and destroyed. And I beg to remark, that, when at home, and at liberty to superintend this process, I have never found my servants disinclined to do it; but, without the master's presence, no reliance can be placed on the men using the lime *in the very hot state*, which is the great point after all—for the fly, (known as the Chrysomela saltitoria,) and its larvæ, are so completely burnt and suffocated, or debilitated, that, before any can recover themselves, the young turnip plants will be sure to be in a rough leaf; which, according to all my observations, is a state of security.'

"It would seem, from Mr. Birk's experiments, that his success was not dependant upon the lime being in a hot state; though, doubtless, in that state, it is far more efficient. It will be easy, and is very desirable, instead of spreading by hand, to do it by a machine, to which purpose the common drill, with tillage hoppers, might be very readily adapted. The difficulties of the manual process will be thus avoided, and the expense of the operation much lessened; whilst the regularity of the work will be greater, and its ultimate success more secure. Mr. Long, Mr. Vevers, Mr. Edwards, and Mr. Shirley Perkins, do not state their operations to require the lime to be spread whilst the dew was on the plant. This, if requisite, would confine the operation to a small part only of the day. Mr. Birks confined himself to that particular time, and so, it appears, have many others who have used the lime. But it is not so evident that it may not be equally well used at any time of the day. The apparent reason of taking that time is, that the lime may adhere to the plant; but, as the under part of the leaves would be still exposed, as well as the stalk, it may be questioned whether the success does not more depend upon the lime injuring the insect, filling up the crevices in which it shelters, and generally lying in its way of passing to and from the plant, than from any effect of the adhesion of the lime to the plant itself. This, however, by a very cursory observation, every farmer may determine, from comparing that part of his field which is sprinkled before the dew is off, with that done afterwards.

"One objection is urged against this plan, which, if generally experienced, would be fatal to its general adoption; that is, that the quick lime injures the plant, and impedes the growth. Mr. Bayldon says he has found this to be the case. Mr. Norwood also states, that *if sown too thick*, it will injure the plant. Mr. Scoton also observes, that lime rather checks the growth, and he therefore prefers soot, which, he says, promotes the growth. On this head, however, we have the clear testimony of Mr. Birks, who spread far more lime than Mr. Perkins or Mr. Long; and who, watching for the effect, found the plant not at all injured. His experiments were also made at a time when, if injury was to be apprehended, it would more certainly occur, as the dew being on the plant would cause the lime to stick more strongly on it, and have greater effect than when sown dry. The silence of other correspondents, who use lime, as to any injury to the plant, also conveys the inference that they have not found it injurious; and upon the whole, we should judge that, taking notice only of these objections in the way of caution, we cannot wisely suffer them to prevent the use of lime.

"We may congratulate the farmer on the satisfactory testimonials in favour of this last method of prevention, and may hope it will be found of the greatest possible benefit. Conjoined with other steps which have been before alluded to, we trust the careful and systematic use of lime will obviate, in a great degree, the danger which has been experienced from the turnip fly; and should the discoveries which we yet look forward to, in the transformation of the insect, not open a more effectual remedy, (which after all may not be the case,) we still have now remedies pointed out, which, if diligently used, will go very far towards preventing the injury so long felt, and so much and justly complained of."

ON THE CULTURE OF POTATOES.

The recent Number of the Irish Farmers' and Gardeners' Magazine appears to present a very sad falling off from those issued at the commencement; but perhaps this may be accounted for by the recent facilities for obtaining foreign assistance, and the extreme worthlessness of those communications connected with the subjects embraced in the Magazine, obtained from Irish farmers and gardeners; for in this branch of Irish industry in particular, we may trace the sad effects of absenteeism, and are fully persuaded that to that alone we may ascribe the present low state of gardening in that part of the empire. The Number before us has some observations on the failure of potato crops, from which we take the following:—

"Much has been said and written on the late failure of the potato crops these last two years, and much information has been given on the subject, to satisfy us that the two chief causes of the failure has proceeded either from the seed being mismanaged, or the mode of preparing the land for planting it, not properly attended to. In order to prove the truth of this assertion, it is only necessary to remark, that these failures were very partial for twenty years previous to the time they became so general; and that during that period the seasons were more favourable in spring for vegetation, and the winters not sufficiently severe to check premature growth in the bulbs; but within these few years past, the winters have been so remarkably mild, that it has caused active vegetation in the bulb, and exhausted it prematurely. During the twenty years stated, we heard little of the care and caution necessary in planting the potato crop, in order to prevent a failure; and we can safely assert that we have seen them managed in every way—drills, beds, and ridges—some cut before planting—others only cut at the time of planting—also the entire bulb—and never knew misses to take place, of any consequence. This we attribute, in a great measure, to the bulbs having well ripened, in consequence of favourable seasons at that period; also the spring seasons hitherto being favourable to the growth of this plant. We recommend depositing the seed at the time the land receives its last planting, or immediately after the drills are opened. It is evident, by this management, that the cuts or potatoes will retain their juices, which give them vigour of growth, from not being exhausted, and that the soil being *fresh*, will produce more active vegetation, and consequently the cut will push forth before it becomes dry, the moisture it contains being a great promoter of its vegetable powers. It is for this reason that the whole potato has been lately recommended; the planting of it is, however, attended with loss; and from throwing out too many sprouts, the potatoes produced, though numerous, are small.

"The following observations on this subject, may further illustrate what we have stated:—1st. In order to provide tubers that will not vegetate too early, plant a late crop, to use for seed the following year. 2nd. Select the sort best suited to the soil, and change the seed every three or four years. 3rd. Plant early potatoes whole, as in this state they are not so likely to rot, which is often the case when their vegetation is slow, and especially on cold and heavy land. 4th. Let the soil be well pulverized, and the dung placed under, and not over the cuts or whole potatoes. 5th. Let the land be tolerably dry and fresh ploughed at the time of planting; the cuts put in with the eyes uppermost, and not too heavily covered. In a dry season, it may be remarked that there are more misses where the cuts are deep, than where shallow—it is far better to put on the necessary additional covering where the plants are well overground. 6th. The bulbs may be planted fresh cut, on dry lands, if sown in April or May; but if for an early crop, or on wet and strong soil, it is safer to cut the bulbs a week or ten days before planting, or to plant the whole potato, of a moderate size, first cutting off one or two weak eyes; when cut, the seed should be spread thin on a dry floor for a few days, in order that the cuts may heal, and afterwards put together in small heaps in a dry and cool place.* With respect to the best mode of cultivation, we think the following valuable communication, on Spade Husbandry, which we have so often recommended, will be most satisfactory; it is a detailed practical statement from the pen of an intelligent writer:—

"TO THE EDITOR OF THE IRISH FARMERS' AND GARDENERS' MAGAZINE.

"'Kilkenny, January 27th, 1836.

"'Dear Sir—Having, in a former communication on the culture of the potato, pointed out the advantages resulting from a fine and deep preparation of the soil, in corroboration, I now beg to trouble you with some further information, derived from an experiment on a larger scale, which I have been kindly supplied with by a friend of mine, Mr. Lyster, near Thurles, that affords a striking proof how well the extra trouble and expense so incurred are repaid. From his memoranda it appears—

"'That in December, 1834, he ploughed up two and a-half acres of wheaten stubble, for potato ground: early in March he harrowed it, and cut the drills as deep as the plough could, at two and a half feet distance; and then, with a Scotch meadow rake, drew back part of the fine mould in the drills, which would otherwise have been too deep. About the end of March, or beginning of April, the sets were planted at a distance from each other of about twelve inches, and covered with dung, and that with about an inch of mould; when they pushed they were covered again with the fine earth between the furrows, leaving the entire on a level. When about six inches over ground, the intervals between the drills were dug as deep as a spade could go, and broken as fine as possible, from side to side, even at the risk of disturbing the plant, which receives no injury from a slight degree of disturbance in the operation, during which the mould is raised about the stems, two or three inches, and no more, in order to keep the plants steady: they were then left so without further care, hand-weeding excepted, until dug out. The produce was as follows:—from two acres of lumpers, 190 barrels to each acre, measured; from half an acre of Jerusalem (an earlier potatoe), about 200 barrels to the acre, all of first-rate quality. Mr. Lyster's ordinary crops of drilled potatoes used to be about 100 barrels to the acre; this season, besides the above, he planted potatoes in a portion of a field of better quality, and managed them with the plough, as usual; his produce was 120 barrels to the acre, showing a superiority, from the spade culture, of 70 barrels to the acre, which, estimated at 3*s*. the barrel, amounts to 10*l*. 10*s*. From this the extra expense of spade labour being deducted, which amounted to 40*s*. an acre, or forty men, at 1*s*. a day, a clear profit results of 8*l*. 10*s*. on each. A profit so considerable, renders it at least a safe practice; nor does it rest here, as it may be presumed that the succeeding crop of wheat will derive a proportionate benefit from such superior tillage. Another inducement to adopt spade labour, is the additional occupation it would afford the poor at a dead season of the year—one of no small weight, in my apprehension, in this country, where so many evils, physical, moral, and political, may be traced to the want of it.

"The experiment was tried by Mr. Lyster, at my instance, from a conviction that the ordinary plough tillage is too coarse and shallow to afford a maximum produce, knowing that the radical fibres of the potato, as I mentioned in a former communication to you, will run to an extent of three feet in depth, if the ground be suitably prepared for them.

"On the same principle, I also planted, the last season, potatoes in a piece of ground trenched two spades deep, and in another, dug only one spade, the preparation in each respect being the same: the trenched ground produced at least one-fourth more than that dug. In another piece I planted immature seed, dug out when the stalks were green; it grew without failure, and as well as any other, but had been kept in a pit. Seed taken from a heap, housed and planted at the same time, failed in a great degree.

"'It is satisfactory to find, that there are no failures this year in the potato crop. I am persuaded that in most instances, it has been owing to the improper care and selection of the seed, by taking it from housed heaps, instead of choosing the best, early, and preserving it out of doors, in small pits.

"'I remain, dear Sir, your's faithfully,

"JOHN ROBERTSON.

"'*To Mr. Martin Doyle.*'"

"'It may also be remarked that the bulbs, in excessive dry summers, throw out a second growth of tubers, which materially exhaust them, and consequently make them uncertain, as seed. Under all circumstances, however, the bulbs should be kept cut in narrow dry pits, and disturbed in the spring, when they commence to show their buds, which should be checked by spreading them on a dry floor.

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* Save seeds from the apples, for the purpose of reproducing good sorts, and never plant the same land more than twice in succession with this crop.

"Colonel Blacker, of Carrick, in the County of Armagh, has favoured us with the following communication, which is well worth the attention of farmers. The advantages of planting the scoops, no doubt, is great; but in order to prevent failure, the land thus planted should be brought into a pulverized state—the scoops put in fresh—and the soil, at the time planted, containing sufficient moisture to promote quick vegetation. Under such circumstances, the shoots from the tubers may also be planted for a crop in the same manner. We have seen excellent crops produced in both ways.

"On the 28th of April, Colonel Blacker planted ten potatoes of a large size, purchased at Hickey's, in Sackville-street, and weighing seven pounds; three of them were planted entire, nearly two feet asunder, and due attention paid to moulding, &c. The sets were taken from the remaining seven, with the scoop, and planted at the usual distance in drill. They were dug out on the 28th of October, when the three entire ones were found to produce 21 lbs. of potatoes, being *seven* pounds from each. The produce of the remaining seven was 77 lbs., being *eleven* pounds to each potatoe, besides what remained for use after scooping. In the beginning of May, Colonel Blacker planted nine potatoes of a remarkable large kind, on ley ground, at a distance of about twenty inches asunder; one failed—the remaining eight produced 46 lbs. of potatoes, being less than six pounds from each. On a space of ground equal to that which these nine occupied, were planted the scooped sets to two potatoes of the same kind, the produce from which was 52 lbs of potatoes, being 26 lbs. from each potato, besides the residue after scooping, as before mentioned. These latter potatoes were procured from a gentleman in the neighbourhood, who called them, from their great size, by the formidable name of '*stagger the beggars.*' Ten hundred weight of potatoes were procured from this gentleman, and after scooping out the sets, which were uncommonly numerous, some potatoes yielding twenty, there was left nearly seven hundred weight of prime food for the pigs, &c."

THE AGRICULTURE OF CASHMERE.

(*From a Paper of the late W. Moorcroft, Esq.*)

THE city of Cashmere is situated in the midst of numerous lakes, connected with each other, and with the river Vedusta, by canals, separated by narrow lines and insulated plots of ground; in some localities so far raised above the water-line as to be out of danger of submersion on any rise of the water; but the greater portion lying so low as to be subject to be drowned, in considerable inundations, which are not uncommon, and, indeed, become annually more frequent, through the neglect of the government in not checking the accumulating growth of weeds and mud, which diminish the depth of the lakes, and consequently increase their surface.

These circumstances have suggested an expedient by which certain vegetables are cultivated in safety, and so that they derive as much moisture as may be beneficial to them without being exposed to the risk of being destroyed. This is effected through the medium of a floating support, of which the buoyancy and flexibility prevent the plants sinking into the mass, or being partially covered with it. Various aquatic plants spring from the bottom of the lakes, as water-lilies, confervæ, sedges, reeds, &c.; and as the boats which traverse these waters take generally the shortest lines they can pursue to the place of their destination, the lakes are in some parts cut, as it were, into avenues separated by beds of sedges and reeds. In these places, then, the farmer establishes his cucumber and melon-floats, by cutting off the roots of the aquatic plants just mentioned about two feet under the water, so that they completely lose all connection with the bottom of the lake, but retain their former situation in respect to each other. When thus detached from the soil they are pressed into somewhat closer contact, and formed into beds of about two yards breadth, and of indefinite length. The heads of the sedges, reeds, and other plants of the float are next cut off and laid upon its surface, and covered with a thin coat of mud, which, at first interrupted in its descent, gradually sinks into the mass of matted roots. The bed floats, but is kept in its place by a stake of willow driven through it at each end, which admits of its rising and falling in accommodation to the rise and fall of the water. By means of a long pole thrust amongst the reeds at the bottom of the lake from the side of a boat, and turned round several times in the same direction, a quantity of confervæ and of other plants are torn off from the bottom, and carried in the boat to the platform, where the weeds are twisted into conical mounds about two feet in diameter at their base, and of the same height, terminating at the top in a hollow, which is filled with fresh soft mud drawn from the bottom of the lake, to which sometimes wood-ashes are added, though much more frequently omitted. The farmer has in preparation a number of cucumber and melon plants, which have been raised under mats, and of these, when they have four leaves, he places three plants in the basin of every cone or mound, of which a double row runs along the edge of every bed at about two feet distance from each other. No further care is necessary except that of collecting the fruit; and the expense of preparing the platforms and cones is confined to the value of the labour, which altogether is trifling, as the work is very soon done. Perhaps a more economical method of raising cucumbers cannot be devised; and though the narrow beds are ordinarily almost in contact by their sides, yet, from their flexible nature, they are so easily separable that a small boat may be readily pushed betwixt the lines without injuring their structure; and, for the most part, they will bear a man's weight, though generally the fruit is picked off from the boat. I traversed a tract of about fifty acres of these floating gardens in cucumbers and melons, and saw not above half a dozen unhealthy plants; nor have I seen, in the cucumber and melon grounds, in the vicinity of very populous cities in Europe or in Asia, so large an expanse of plant in a state equally healthy, though, it must be observed, running into somewhat too great luxuriance of growth.

It is presumed that the onion may be raised largely also in this manner, from the fact of my having met with a variety in Ladakh growing in swamps, and which, from its habit and from the colour of its flower, I have named the golden-headed swamp onion, of which some seeds are now transmitted. And perhaps water culture may be found susceptible of being extended to many other plants besides these. The traveller who finds the water melon of vast size buried in the hot and dry sand of the desert would not be readily tempted to conclude that it could be raised in nearly equal luxuriance of growth in the cool and humid atmosphere of a floating garden. Yet the fact points out an accommodating power in the constitution of this plant, which may be as largely found in others where at present it has not been supposed to reside. And the subject is of extreme importance, the water surface of our islands having never been suitably called upon to contribute its share of produce to the maintenance of our population.

On one of my visits to these floating gardens I observed that the stems of many plants had been newly earthed up with a few handfuls of black mud brought from the bottom of the lake. The general depth of the floating beds, or mass of reeds and of earth taken together, was about two feet, and some of the beds were about seven feet broad. The general arrangement was a line of cucumber cones bordering each edge, and one of water or of musk-melon along the middle. The melon plants were peculiarly strong, and their cones were wound round with a fresh addition of confervæ and of other weeds, so as to give to each about five feet in diameter. The season lasts for three months and a half, beginning in June. The fruit is seldom or never pulled in the small or girkin state, and differs in weight, when of a proper age for the market, from about eight or ten ounces to a pound and quarter, or a pound and half. From the first setting of the fruit to the time of pulling, seven or eight days are the ordinary period. Having been much acquainted with the unwillingness of the farmers of the east to make a true report of the produce of their farms, I employed a servant of mine, who lived amongst the water-gardeners, to obtain an accurate account of the yield of a cone. He stated, that in answer to his inquiries, the gardeners acknowledged that thirty full-sized fruit from each plant, or from ninety to a hundred from each cone, were the average crop in the season. In the early part cucumbers of full size sell at the rate of about three for a piece of coin of the value of a halfpenny; but as the weather becomes hotter, and the plants get into full bearing, ten, fifteen, and even twenty, are purchased for this price. It is calculated that every cone yields a money return of about eighteen-pence, or each plant about six tunga of two pice each. Allowing sixpence for labour of every description, and including also the tax, the clear profit is a shilling for every two square yards. The yield of the melon and the water-melon is numerically less, but the return of profit is at least equal, in consequence of the fruit being sold at from a halfpenny to twopence each. The seed of the melon is brought annually from Baltistan, or Little Tibut, and the first year yields fruit of from four to nine and ten pounds each in weight; but if the seed of this melon be resown, the produce of the second year exceeds not from two to three pounds. On a more minute inquiry it would seem that the melons are sweet and well flavoured, whilst the water melons are of the common quality of this fruit. Unless when eaten to great excess, the melon produces not any derangement in the intestines, but otherwise sometimes causes purging. It is remarked that healthy people who live upon this fruit almost wholly during the season, become speedily fat; and the same effect is reported in regard to horses fed upon this fruit at Bokhara. Although water-mint grows spontaneously upon the floats, and the return is so profitable in cucumbers, no other vegetables are raised upon the spaces betwixt the cones. In fact, however, there are so few esculent vegetables in this country, that this apparent neglect affords no matter for surprise. Pennyroyal, cresses, and other useful vegetables, might certainly be raised upon them; and from what I have seen of the aquatic habits of lucerne, I am led to think that this plant would also flourish, and its long tap-root speedily tend to consolidate the crust. Thefts of whole floats are sometimes committed by persons joining in two or three boats to tow them off to distant parts of the lake in the night, and the property thus stolen is difficult to be identified. To prevent this depredation, and also night robbery of the cones, two persons generally sleep in a boat, which is pushed under the shelter of a roof of mats that is permanent during the season. The floating gardens are generally cut off from the body of the lake by a belt of floating reeds, which also answer, in some degree, the purpose of defending the cones against the effects of winds. The boatways through this fence are closed by twisted withes of willow twigs, which, passing through the ends of the beds, join them so accurately as to prevent the union being recognized, except by persons acquainted with the fence. Altogether this variety of farming is highly profitable, and ought to be adopted in Europe, as a great resource for raising food for man.

THE ECONOMY OF VEGETATION.

BY T——M, ESQ.

It is evident, from the sacred records, that the cereal plants or grasses, have been cultivated from the earliest times; and the valley of the Nile has been celebrated for its fertility in corn as far back as historical research can penetrate. But wheat is not now to be found in a wild state; like the camel, its original seat is unknown, and its connection with mankind unalienable; and whether, therefore, it was the gift of Heaven to man, or merely an improved variety of a wild grass, is likely to remain for ever a secret.

The ancients, indeed, paid but little attention to the physiology of plants; still, in the necessary attention agriculture and gardening demanded, it seems almost impossible that the organs of vegetables, at least as far as they subtended to the perfection and improvement of edible fruits, should have been entirely unnoticed; and indeed there is historical proof that they were not, as far as regards the palm family. Herodotus states that the Babylonians paid great attention to the cultivation of the date palm, when they necessarily discovered that there were two kinds of these trees, *one* of which only bore any fruit. The other kind was of course discarded, till it was found, eventually, that a plantation of fruit-bearing palms would not succeed unless some of the trees that bore blossoms only were planted with them. On this simple fact is founded the celebrated system of Linnæus.

One might have thought that the sages of Greece would have noticed the bearing of the account of their own historian upon the whole vegetable creation; but while they were disputing about the fortuitous concourse of atoms, and lolling in their tubs, in the pride of a false philosophy, they suffered it to escape them; and, strange to say, it was left to a humble Swede of the 18th century to prove the universal application of the principle to all phenogamous or flowering plants. This admirable artificial system, which has thus immortalized Linnæus, is formed from the diversified disposition of the organs of fructification in flowers; and accordingly he has divided them into classes and orders, according to the number and arrangement of the stamens and pistils. These are, indeed, the only essential parts of a flower; the pollen of the stamen must be scattered upon and imbibed by the pistil, or no germinating seed will be produced, and Nature has provided for this in a variety of ways. When the stamens and pistils are united in one flower, it is termed hermaphrodite, and the slightest zephyr agitating the blossom, or the mere force of gravity, when the stamens hang down above the lengthened pistil, is sufficient for fertilization. But when these essential organs are in different flowers on the same plant, hence called *monœcious*, as in the corylus, or hazel; or in separate flowers, on different and often distant individuals, called *diœcious*, the agency of winds and insects is indispensable to accomplish the intended purpose of Providence. Thus, as it has been well observed, the brilliant petals that we so much admire in flowers, are but embroidered curtains of the nuptial couch of Flora; or, to speak more correctly, they are the protecting tent beneath which the infant hopes of a new family are sheltered from the rain and the dews of night; and undrawing their colorific drapery as the morning sun beaming from the east invites their charge to the pleasures to be derived from his cheering influence—when the melody of birds floats upon the air, the first hum of insect life comes careering upon the zephyr, and the zephyr is itself redolent of fragrance.

But the phenomena I have alluded to claims our attention not merely as the source of the Linnæan system, but as the basis of those horticultural experiments by which, in the present day, new varieties of delicious fruits are continually added to our stock. Mr. Knight, the amiable president of the London Horticultural Society, led the way in this adaptation of theory to the uses of life; by the skilful transference of the pollen of one fruit tree to another, he has produced many excellent varieties; other gentlemen have followed his example, and a boundless field extends itself for investigation and improvement. Dr. Darwin, in his poem of the "Botanic Garden," has most fancifully but poetically illustrated the Linnæan system, and amusingly tells us, how

> ——— "On each leaf the tiny graces dwell,
> How laugh the pleasures in a blossom's bell."

The system of Linnæus, confessedly artificial, was not calculated for the cryptogamious plants, or those with inconspicuous flowers, and he could not bend them to the principles that had influenced the rest; besides which anomalies continually occur in the number of the stamens, not only in species of the same genus, but even in individuals of the same species; hence, his system, notwithstanding its having the advantage of all others in facility, is considered, as a whole, not in conformity to the natural affinities of plants with each other; and, consequently, the system of Jussieu, as improved by the learned De Candolle, now claims the pre-eminence, under the somewhat assumptive denomination of "the natural system."

As it is useless to stem the torrent of fashion, let us sail on the stream, and, forgetting Linnæus *pro tempore*, range ourselves under the banners of De Candolle and "the natural method," till another method more natural still, sweeps its rival from the contested field. The excellence of this system is stated by its advocates to be founded on the most remarkable and obvious distinctions observable in Nature—the elemental structure, the components of the seed, and affinity in resemblance and general character; and thus the different parts of a plant are here investigated with more accuracy. This is all very true, but then, like the "philosopher of the Odenwald," if you become a genuine student of the "natural method," you must travel with a spade slung at your back, and hammer, hatchet, and chisels girded to your waist; for the true botanist must not be afraid of the bog, or the forest, or shrink from the embraces of the briar or bramble. "The natural system" is founded on the radicle cotyledons of the embryo of the plant, and its primary groups are arranged according to the number of these cotyledons. Thus, I. The *acotyledones*, are plants devoid of flowers properly so called, and without embryo or cotyledons. These correspond with the cryptogamia of the Linnæan classification, and include the ferns, mosses, lichens, fungi, &c. II. *Monocotyledones*, are those whose embryo is of a single piece, developing a single leaf when it germinates. The graminiæ, palms, liliaceæ, &c. are here included. III. *Dicotyledones*, include plants whose embryo having two cotyledons, developes two seminal leaves in germinating. The lupine is a well known example, and the labiatæ, cruciferæ, &c. and all forest trees (palms excepted) belong to dicotyledonous vegetables, whose number is greater than that of the other two divisions put together. It must be admitted that this classification, with its subdivisions into natural families, is much superior to the systems which it in a great measure supersedes, on account of the general and philosophical ideas which it affords us respecting the productions of the vegetable kingdom. It does not consider objects separately, but collects and arranges them into groups or families, according to the greatest number of common characters which they possess. The arrangement and classification of the vegetable tribes, by one or other of the methods I have here indicated, or, indeed, by any other that you may select or devise, constitutes the study of *systematic botany*.

But we must not rest satisfied with mere arrangement—a more noble field presents itself. Plants are materially influenced in their proper development by different soils, by latitude, by temperature, and by elevation, and thus the Flora of one country is essentially distinct from that of another, each separate region of the land and water being occupied by distinct groups. This department, however, presents difficulties that no diversities of height or temperature satisfactorily solve—we find analogy of climate in the old and new continents without identity of production; nor can we at present explain why no rose belongs to the southern hemisphere, why equinoctial Africa produces no laurinise, and the whole of America no species of heath. Many islands are as distinct in their vegetation as we might expect to find them were they satellites separate from our earth; for out of 533 species of flowering plants found in the Canary Isles, 510 of them are peculiar to those isles; and in the Flora of St. Helena, out of sixty-one native species, only two or three have ever been found in any other part of the globe. These unexpected facts almost tempt us to inquire whether such islands are centres of new creations, or fragments of other worlds; but geology must answer these questions if she can, and I must not now trespass farther on the *geography and natural distribution of plants*.

As vegetables hold a distinguished place in the economy of Nature, their organic structure necessarily demands attention. The future plant exists in embryo in the seed, and while the infant stem ascends into light and air, the root *descends* to seek that moisture and nourishment from the decomposition of water and the various soluble salts of the soil, which is necessary for the full development of the young plant. Thus the delicate spongioles of the root act as its guardians, and it is their duty to raise the supplies needed for its wants; and this they perform with great assiduity, spreading round in all directions, seeking and imbibing the nutriment required, which by the circulation of the sap, is conveyed to every part of the stem and branches. The leaves now appear, not perhaps improperly called the *lungs* of plants, since they certainly decompose the air, and inhale and respire gases; yet perhaps their hydraulic agency is their chief office as regards the plant, for in proportion to the quantity of foliage is its need and consumption of water, and the aqueous matter perspired by the leaves assists the intestine impulse of the swelling vessels. At last, the plant arrives at maturity, and sends forth its progeny to spread abroad on the earth. The spring has witnessed its increasing efforts—the summer its matured beauty and "ardent strength;" but autumn now arrives—it drops its leaves—the sap is arrested in its flow, and it retires to rest for a time from the cares and bustle of active life.

> "Go, mark the matchless workings of that Pow'r
> That shuts within the seed the future flow'r;
> Bids some in elegance of form excel,
> In colour *these*, and *those* delight the smell;
> Sends Nature forth the daughter of the skies,
> To dance on earth and charm all human eyes."
>
> COWPER.

The nutriment which plants obtain from the carbon in water, and the carbonic acid they inhale from the atmosphere, is of the utmost importance to man and animals, who consume a vast variety of plants, and in their turn exhaling carbon in breathing, augment the resources of floral life; and even when the animating principle has departed from them, their decaying bodies furnish stimulating powers to form new combinations with vegetables. Thus is there a constant harmony between the animal and vegetable tribes. Air, vitiated by the respiration of animals, becomes favourable for absorption by vegetables; and throughout the day many vegetables exhale from their leaves a gas absolutely necessary for the purposes of animal life. But to explain in detail all these phenomena, is the peculiar province of *Vegetable Physiology*.

ON THE PENNY-ROYAL.

PENNY-ROYAL is a plant pretty generally known, being found every where on heaths in moist places, and flowering in September.

The root of this plant is creeping. The stems are bluntly quadrangular, procumbent, downy at the upper part, and sending up erect, flowering ones to the height of eight or nine inches. The leaves are scarcely an inch in length, petiolated, ovate, obtuse, unequally serrated, with numerous pellucid dots, and slightly airy underneath. The axillary cymes, which are supported on short, downy, purplish stalks, are numerous, many-flowered, sessile, and of a pale lilac colour. The calyx is five-cleft, tubular, slender, nearly cylindrical, strongly furrowed, and clothed with short downy hairs; five-cleft, with the teeth unequal, pointed and fringed. The corolla is longer than the calyx, externally hairy, of a light purple, and sometimes of a white colour. The stamens are erect, and longer than the corolla; the germen is four-cleft, with a slender style, furnished with a bifid stigma.

In its wild state, the plant trails upon the ground, and strikes root at the joints; but the markets are usually supplied with a garden variety, which is larger than the other, and grows nearly upright.

Many virtues are ascribed to mint by the ancients, but we are ignorant of the species to which they refer. Ovid asks,

> ———————"An tibi quondam
> Fœmineos artus in olentes vertere menthas
> Persephone, licuit?"
>
> *Ovid Met.* l. x. 728.

From the allegorical accounts given by the ancients of their mints, it would seem that they ascribed to them terrible effects, and such powers as are now not known to belong to any of the species; for the poets feign that Mintha, the daughter of

Cocytus, was transformed into the plant which still bears her name: our mint and Mentha being words but slightly altered from the Greek.

Peppermint possesses a greater degree of pungency than any of the other kinds. The leaves have a considerable degree of aromatic odour and taste: the flavour becoming pungent, followed by a sensation of coolness on the tongue. They afford an essential oil, rich in the aromatic quality and pungency of the herb, and holding camphor in solution.

Peppermint is used as a stimulant and carminative, to obviate nausea, or griping, or to relieve the symptoms arising from flatulence; and, very frequently, to cover the taste and odour of other medicines. It is used for these purposes under the forms of the watery infusion, the distilled water, the essential oil, and the lozenge prepared from the oil or the essence, as it is called, formed by dissolving a small quantity in alcohol. Mr. Neill says, "the young leaves and tops of spear-mint are a good deal used in spring salads in England; they also form an ingredient in soups, or are more frequently employed to give flavour, being boiled for a time and withdrawn. They are also shredded down, and mixed with sugar and vinegar, as a sauce to roasted meat, particularly lamb."

SLIGHT NOTICE OF THE FLORA OF MAURITIUS.

The small extent of the Island of Mauritius, and its remote situation in the middle of the ocean, have necessarily limited the number of its vegetable productions; and various other causes, besides aiding to the same effect, have tended to stamp these productions with a peculiar character. The moderate height of its mountains is unfavourable to the propagation of alpine plants; and the thickness of its woods to that of such as require the full influence of the solar rays; while its rocky shores are covered with an animated crust that effectually prevents the establishment of those which vegetate only beneath the surface of the waves. We find, accordingly, the *Flora Mauritiana* limited almost exclusively to trees; to climbing plants, which possess the faculty of elevating themselves, by the aid of trees, to seek the air and the light; and to a less aspiring tribe, which satisfied with a smaller share of those vivifying elements, court the obscurity of the shade.

On approaching the shore at the mouths of the rivers and bottoms of the bays, where the sea is always tranquil, the first object we encounter is a belt of Mangrove trees (*Rhizophora mucronata*, and *gymnorhiza*) edging the coast, and pushing even into the water. After we have crossed this belt, we come to another consisting of a great variety of trees and shrubs, that flourish within the reach of the sea-breeze. Among these we find the *Hibiscus tiliaceus* and *populneus* displaying their large bell-shaped yellow flowers, the *Hernandia sonora*, the *Erythrina carnea* and *Corallodendron*, with their superb spikes of scarlet blossoms, the *Barringtonia speciosa*, the *Ehretia argentea*, *Scævola Kœnigii*, and *Pemphis acidula*. Along with these we also find various species of *Convolvulus* and *Ipomœa* intertwined in elegant festoons, or trailing amongst the grass.

Round a considerable portion of the island we can plunge at once from the shore into the forest, where we are struck, at first sight, with the great size of many of the trees, the height and straightness of their branchless trunks, and the comparative scantiness of their foliage. We are led, at the same time, to admire the various means by which nature, as if ashamed of the decay of her works, strives to conceal the approaches of old age by the aid of borrowed verdure. The numerous tribe of climbers are seen winding their flexile stems round the trunks of the aged trees, until they have arrived at the highest branches; then shooting down their filiform suckers to take root again in the soil, and thence absorb a fresh supply of juices. The creeping plants ascend more slowly; but garnish their supporters as they ascend with elegant wreaths of verdure. Lastly, the *parasitical plants*, properly so called, the *Orchideæ* and the *Dracenæ* fix themselves on the bark, and throw out spikes of variegated flowers that sweeten the atmosphere with their odour. At length, however, the branches begin to drop off, and the whole tree runs rapidly to decay. At this stage it is deserted by all those plants that had lent their foliage to grace its latter days, and the veteran is left to fall alone.

The surface of the ground is occupied chiefly by the *Ferns*. This extensive tribe seems to have been designed for the shade, as their vegetation is never more rapid, nor more luxuriant, than when they are buried in the most profound obscurity. This must be understood, however, with some limitation, there being several species that creep along the trunks of the trees; others which establish themselves at once as parasites, high up among the branches: and not a few that elevate their spreading parasols on their proper stem to the height of many fathoms.

Those parts of the island that have been stripped of their native wood, and left in an uncultivated state, are annually overgrown with a thick crop of hard, reed-like grasses, consisting, for the most part, of *Anthistiria*, *Panicum*, and *Andropogon*. At the commencement of the rainy season, these grasses spring up with such rapidity, that in the course of a few weeks the ground is covered to the height of several feet and exhibits an uninterrupted coat of verdure. This pleasing colour, however, soon passes away, and is succeeded by a fiery brown of a very opposite character. Vegetation now ceases entirely, and the sun and wind, asserting their power, lay the whole prostrate along the ground, where it lies bleached to whiteness, until, on the return of the periodical rains, a fresh crop springs up and covers it from view.

ON THE PEPPER MINT.

Several species of Mint are cultivated for medicinal and culinary uses. Of these the most important are Peppermint, *Mentha piperita;* Spearmint, M. *viridis;* and Penny-royal, M. *Pulegium*. They are all of them indigenous to Britain, and hardy perennials; well worthy the attention of those who love to look into flowery hedges,

> "Or into the meadows, where
> Mints perfume the gentle aire,
> And where Flora spreads her treasure."

Peppermint grows wild in some parts of Britain, in watery places, and on the banks of streams, flowering in August and September; but it is not a common native plant. There are three varieties of this species; but the variety *a*, of Smith's "English Flora," is the one generally employed in medicine. At Mitcham, in Surry, there are considerably more than one hundred acres of this herb cultivated for the supply of the London market.

From a creeping rhizoma arises a stalk that is nearly erect, quadrangular, branched, and generally of a purplish colour, with short recurved hairs, to the height of two or three feet. The leaves stand opposite, on short footstalks, are of a dark green colour, ovate, serrated, acute, varying in breadth, smooth and shining above, and paler, with white and purple veins beneath; the leaves are never downy, but the middle rib, on the under side, is beset with short hairs. The spike-like thyrsus of flowers is solitary, bluntish, terminal, about the length of the leaves, interrupted and leafy below, with the lowest axillary cymes more distant, and sometimes spiked. The bracteas are lanceolate and fringed. The flower-stalks are either perfectly smooth, or very slightly hairy above. The calyx is slender, furrowed, covered with pellucid dots: the base quite smooth, and five-cleft, with the teeth dark purple and fringed. The corolla is funnel-shaped, longer than the calyx, and of a purplish colour. The filaments are awl-shaped, straight, and shorter than the limb. The germen is four-lobed, superior, with a slender style, longer than the corolla, and terminated with a bifid stigma.

In external appearance, Peppermint corresponds with

Mentha viridis, for which it may easily be mistaken; but in that the leaves are sessile, and narrower in proportion to their length; the thyrsi are longer, and composed of more cymes. "England," says Sir J. E. Smith, "has already been known as the country of the true M. *piperita*. What supplies its place in the north of Europe, is merely a variety of M. *hirsuta*, having a similar odour; and this is named *piperita* in the Linnæan herbarium." Two varieties, a narrow-leaved and a broad-leaved, are cultivated in gardens, and some variegated kinds are considered as ornamental plants, particularly a reddish variety, called Orange Mint.

ON THE SPEAR MINT.

Spearmint grows naturally in marshy places, and by the banks of rivers; but it is more rarely met with in this state than the preceding species. It was found many years ago by Hudson, on the banks of the Thames, and Mr. Sole mentions it as growing on a common between Glastonbury and Wells, in a meadow four miles from Bath, and in many places on the banks of the Avon. It produces its flowers in August.

From a rhizoma, resembling that of the mentha piperita, rises a stem that is erect, branched, acutely angular, smooth, sometimes purplish, to the height of two or three feet. The leaves are of a lively green colour, about two inches and a half long, and an inch broad, lanceolate, nearly sessile, opposite, and sometimes a little hairy underneath. The stems and branches are terminated by long panicled, acute spiciform thyrsi, the axillary cymes of which are mostly a little remote, and furnished with narrow lanceolate bracteas; the flower-stalks are smooth and polished; the calyx is bell-shaped, generally smooth, having five nearly equal teeth, and sprinkled like the foliage with minute resinous dots; the corolla is funnel-shaped, smooth, and of a light purple colour; the stamens are generally shorter than the corolla, with roundish anthers; the germen is four-lobed, with a filiform style, and a bifid stigma. The seeds are four, small, and usually abortive.

THE OFFICINAL STORAX TREE.

This tree, or shrub, is chiefly remarkable for producing the very powerful and fragrant balsam, called storax. It is a native of Syria, and the Levant; and is not uncommon all over Greece and the Peloponnesus, being known by the name of λαγομηλιά, in modern Greek. Dr. Sibthorp found it called στουράκι, a slight alteration of its original appellation. The shrub is naturalized in hedges in some parts of Italy, particularly about Tivoli, and was cultivated in England by Gerarde, before the year 1597. It is rarely met with in our gardens; but a very large tree is trained against the wall in the Botanic Garden at Chelsea, and regularly clothed with a profusion of its white blossoms every year, in May or June. This tree, Sir James Smith informs us, is the finest he ever beheld.

The storax tree is of a middling size, seldom exceeding fifteen or twenty feet in height, with irregular, alternate, round, leafy branches, downy when young. The leaves are deciduous, elliptical, entire, somewhat pointed, and well compared by the old botanists to those of a quince: they are alternate, petiolate, smooth, of a fine green colour on the upper surface, and covered with hoary stellated down underneath. The flowers are in clusters, terminating the young lateral shoots, containing from two to five, or six, white flowers each. The calyx, as well as the corolla, is white and downy; the corolla is mono-or syn-petalous, funnel-shaped, and divided at the limb into five deep, elliptical, oblong, obtuse, spreading segments: the filaments are ten, placed in a ring, awl-shaped, and inserted into the corolla; the anthers are yellow, erect, and oblong; the germen is oval, with a slender style and simple stigma. The fruit is a drupe of a globular form, containing one or two angular nuts, convex on one side and concave on the other.

Qualities and chemical Properties.—The best storax comes only from Asiatic Turkey, and is obtained in a fluid state from incisions made in the bark of the trunk, or branches, of the storax tree. The tree is never wounded under six years of age, and cannot bear the annual incisions above twelve years. It is brought from Turkey, but is so adulterated, that it is very rarely met with in a pure state. Storax is bitter and pungent to the taste, and has a strong fragrant odour. Two sorts of this balsam are found in the market: storax in the tear, and common storax in larger masses. This has been called "storax in the lump," "red storax," and the separate drops "storax in the tear." The former is very rarely in separate tears, but in masses, composed of small white and pale reddish lumps, or having a uniform reddish yellow, or brownish appearance; being unctuous to the touch; soft, like wax; and free from visible impurities. This is the Στύραξ καλαμίτης of the ancient Greeks. According to Galen, it was formerly brought from Pamphylia, in hollow canes or reeds; whence it was called *styrax calamita*. It is preferred to the common storax, in larger masses, which are lighter, less compact than the preceding, and have a large admixture of woody matter, like saw-dust. Although the impurities of this kind of storax render it less valuable than the other, it is not less useful, and when purified, its medical qualities are no less potent. Storax should be chosen of a reddish-brown colour, rather softish; unctuous to the touch, yet brittle and friable; and of a pleasant, sweet smell.

FLOWERING OF A WEST INDIA PLANT
IN THE OPEN AIR.

At a meeting of the Ashmolean Society of Oxford, on the 6th of November last, Dr. Daubeny exhibited a specimen of the *Bromelia pinguis*, a native of the West Indies, which flowered last autumn in the open air in the garden of Mr. Shirley, of Eatington Park, near Shipston-upon-Stour. This plant has rarely blossomed in Europe even under glass, although a drawing of it in flower is given in the *Hortus Helthamensis*; and the individual plant alluded to had been tried first in the pinery, and afterwards in the greenhouse, but had never put forth flowers, till it was taken out of doors, when it flowered, though the petals never properly expanded.

Phosphoric Light emitted by Flowers.

At the same meeting, a communication was also read by him respecting an electrical phenomenon, which occurred in the garden of the Duke of Buckingham, at Stowe. On the evening of Friday, the 4th of September, 1835, during a storm of thunder and lightning, accompanied by heavy rain, the leaves of the flower called *Œnothera macrocarpa*, a bed of which is in the garden, immediately opposite the windows of the manuscript library at Stowe, were observed to be brilliantly illuminated by phosphoric light. During the intervals of the flashes of lightning, the night was exceedingly dark, and nothing else could be distinguished in the gloom except the bright light upon the leaves of these flowers. The luminous appearance continued uninterruptedly for a considerable length of time: it did not appear to resemble any electric effect: and the opinion which seemed most probable was, that the plant, like many known instances, has a power of absorbing light, and giving it out under peculiar circumstances.

BEET-ROOT SUGAR.

The exertions making in France and throughout Germany to simplify the process of preparing sugar from the beet are immense and unceasing. At the recent meeting of the German naturalists, at Bonn, the section of Agriculture and Rural Economy was almost entirely occupied with papers and discussions on the subject. At Valenciennes, a manufacturer has succeded in discovering a method of crystallizikg the whole of the saccharine matter of the beet, without producing molasses in the process. Three sugar houses there have adopted the new plan.

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The Gardener's Dictionary; containing the best and newest methods of cultivating and improving the Kitchen, Fruit, and Flower Garden, and Nursery; as also, for performing the practical parts of Agriculture. By Philip Miller, F.R.S.—Parts 18 to 28. London: Henderson. 1836.

Botany we consider that branch of natural history which relates to the structure, vital action, classification, and uses of those objects in the organic world which we call plants. In the language of some persons, indeed, it is confined to a mere explanation of the art of classifying plants, and to the power of using such classifications so as to ascertain the name of a given species with certainty; by others it is allowed to comprehend a knowledge of the various kinds of structure which we meet with in the vegetable kingdom, but scarcely to extend beyond those two departments. But, in reality, the former of these objects, however important, is only a collateral branch of the subject; and the latter is but a portion, although an essential one, of those investigations from which botany derives its claim to the rank of science.

The study of the works of nature, independently of its contributing in a powerful degree to elevate the mind of man, and to bring him into communion with his Creator, is of great consequence, as being the means by which he is enabled to compel all living things to minister to his comforts, his pleasures, or his necessities. It is to the latter objects, chiefly, that naturalists usually direct their attention; because it is justly supposed that all higher considerations of necessity grow out of the investigations in which we must engage, in order to apply any branch of natural history to practical purposes.

The properties of vegetable productions, with reference to their utility to mankind, are influenced by the species or varieties from which they are derived; by the mechanical structure or chemical composition of the part of the plant made use of; and by the phenomena and changes connected with the action of the vital principle of vegetation, which may be considered either independently of external circumstances, or when controlled either by natural causes or by artificial means. In order to apply the knowledge of such objects usefully, and to render it available to others, arrangement and method are indispensable; not only in regard to the ideas derived from a consideration of the nature of plants, but in regard to plants themselves.

Such being the varied objects to which bbtany directs our attention, we are always delighted when any work appears that brings an increase to our knowledge in this department of natural history. We need not after this say with what pleasure we again direct the attention of our readers to the work before us; which treats of every vegetable from "the hyssop which groweth on the wall to the tall and stately cedar." What can give us a clear insight into the ability with which the work is conducted than the following account of the saffron?

"Carthamus. Class Syngenesia Æqualis. Nat. Ord. *Compositæ.*

"The Characters are—*Receptacle paleaceous setose; involucrum ovate, imbricated; scales ovate, leafy at end; pappus paleaceous, hairy, or none.*

"Carthamus Tinctorius (officinal Carthamus or bastard Saffron). Bot. Reg. t. 170. *Stem quite smooth; leaves ovate, entire, spiny-toothed; fruit naked.*—An annual plant, sometimes three feet high. Stem whitish, upright, solid, rigid, branched upwards. The branches are scattered and generally fastigiate. Leaves scattered, cauline, patent, veined, radical ones oblong, narrowed towards the base. Flowers rather large, terminal, solitary, standing upon a thickened fistular, terminal peduncle continuous with each branch," smelling something like the true saffron. Calyx scales broad at the base, flat, resembling the leaves; florets discoid and fertile, an inch or more long, overtopping the calyx. They are of a fine orange-red or *saffron* colour. Seeds white, shining, naked.—It flowers in July and August, and the seeds ripen in autumn; but if the season proves cold and moist, when the plants are in flower, there will be no good seeds produced; so that there are few seasons wherein the seeds of this plant come to perfection in England.

"It grows naturally in Egypt and in some of the warm parts of Asia.

"The seeds have a purgative quality, and are said to be particularly useful when the first passages are surcharged with a thick viscous mucus. They are a favourite food of parrots; so that it is sometimes called 'parrots' corn,' being a grateful and wholesome food for that tribe of birds, although noxious, as it is said, to all other animals. The flowers are supposed to have the same medicinal properties as saffron; but they are chiefly used as a material for dyeing silk and cotton stuffs, to which they give a beautiful but fugitive rose colour. A red pigment is likewise prepared from the stamens; used by painters, and known as a cosmetic rouge by the Parisian ladies, under the name of vegetable rouge, Spanish vermillion, or lake of Carthamus.

"This plant is *propagated* by seeds, which should be sown in April, upon a bed of light earth: the best way is to sow them in drills, drawn two feet and a half distant from each other, in which the seeds should be scattered thinly, for the plants must not stand nearer each other than a foot in the rows; but as some of the seeds will fail, so a greater quantity should be sown, as it will be easy to thin the plants, at the time when the ground is hoed. A fortnight or three weeks after the plants appear, it will be proper to hoe the ground to destroy the weeds, and at the same time the plants should be thinned where they are too close; but at this time they should not be separated to their full distance, lest some of them should afterwards fail; so that if they are now left six inches asunder here will be room enough for the plants to grow, till the next time of hoeing, when they must be thinned to the distance they are to remain: after this they should have a third hoeing, which if carefully performed in dry weather, will destroy the weeds and make the ground clean, so that the plants will require no farther care till they come to flower; when, if the Carthamus flower is intended for use, the florets should be cut off from the eowers as they come to perfection; but this must be performed when they are perfectly dry, and then they should be dried in a kiln, with a moderate fire, in the same manner as the true saffron, which will prepare the commodity for use.

But if the plants are designed for seed, the flowers must not be gathered; for if the florets are cut off, it will render the seeds abortive, though they may swell and grow to their usual size, as I have frequently experienced; yet when they are broken, there will be found nothing more than a shell without any kernel; and this frequently happens to be the case with these seeds, in wet cold seasons; and in very wet ones the germ will rot, and never come so forward as to form a shell.

"This plant was formerly cultivated in the fields in several parts of England, for the dyers' use; and particularly in Gloucestershire, where the common people frequently gathered the florets, and dried them, to give a colour to their puddings and cheesecakes; but by putting in too great a quantity, they acquire a cathartic quality.

"If this plant was ever cultivated here in great quantity, it is surprising how it became to be so totally neglected, as that at present, there are not the least traces to be met with, in any part of England, of its ever having been cultivated; insomuch that the commodity is scarcely known, except to those who deal in it. The quantity annually consumed in England is so great, as to make it a considerable article of trade, so that it might be well worthy of public attention; for although the seeds seldom come to perfection in England, yet these might be procured from abroad, and the plants would constantly produce the flower, which is the only part used in dyeing.

" It appears from Dr. Turner's Herbal, that the bastard saffron or *safflower* was cultivated in England in 1551. Mr. Houghton, in his Collections, says that Henry Hall, Esq., relates (Nov. 14, 1683), that twenty-five acres in the vale of Evesham in Gloucestershire, was sowed with this seed; the soil a mixed sand, of about 15*s.* an acre value; it bore a crop of wheat the year before, was dressed for barley, and had a harrowing extraordinary. This piece of ground was taken for two years by an adventurer in this seed, at the rate of 25*l.* per acre, in consideration that this plant is said to be a great impoverisher of land. He sold the flowers in London for 10*l.* per pound—a price he said, much below his expectation; he gained above 30*s.* an acre clear profit, excepting the price of the seed; but of this there was a plentiful return (about one hundred and forty bushels), which had it been well managed, would have amounted to a considerable value; for want of experience it was too soon gathered, and at a greater charge than needed; neither was it so carefully cured as it ought, which much impaired the price.

" The common people took it for saffron, and privately stole considerable quantities, and used it in their puddings, cakes, and even bread; but finding in it a purgative quality, which to some was very troublesome, they sold their remaining stock to an apothecary.

" Mr. Hall sowed some of the seed in February, and some about the middle of March; both thrived very well, flowered, and was fit to gather in July, and was gathered before the 20th of that month: by which means women and children could be had in plenty to gather the flowers, before gleaning time came on. He also found that plants from which the flower was not gathered, produced seed to the full as good as what is brought from Germany; and that, though it certainly impoverishes the ground, yet that the piece which was sown with *safflower* did, the year following, bear a good crop of oats, and had it been fallowed and well dressed the third year, would have been fit for wheat or safflower again. He adds, 'that turkies greedily fed on the seed, and in a very short time became very fat: that geese fed on it, grew fat much sooner than those of their neighbours, that fed on other grain; and that a colt, eating of this seed, recovered in a short time from great poverty to a very good condition.

" This plant is cultivated in great plenty, in some parts of Germany, where the seeds constantly come to perfection; and as I have obtained a short account of their method of cultivation, from a curious gentleman of that country, so I shall insert it for the benefit of those who may be induced to engage in this undertaking.

The ground in which they propose to sow the Carthamus, has always a double fallow given it, first to destroy the weeds, and afterwards to make it fine. They make choice of their lightest land, and such as is clear from couch grass, and other troublesome weeds. After the land has been fallowed a summer and winter, in which time they give it four ploughings, and harrow it between each, to break the clods, and pulverize it, in the latter end of March they give it the last ploughing, when they lay it in narrow furrows of about five feet or a little more, leaving a space of two feet between each: then they harrow these lands to make them level, and after it is finished, they sow the seeds in the following manner. With a small plough, they draw four shallow furrows in each land, at near a foot and a half distance, into which they scatter the seeds thinly; then with a harrow, whose teeth are little more than one inch long, they draw the earth into the drills to cover the seeds; after this, they draw a roller over the ground, to smooth and settle it. When the plants are come up, so as to be distinguished, they hoe the ground to destroy the weeds; and at this first operation, when the plants happen to be close, they cut up the least promising, leaving them all single, at the distance of three or four inches: which they always suppose will be sufficient room for their growth, till the second time of hoeing, which must be performed in about five weeks after the first, in which they are guided by the growth of the weeds; for as this work is performed with a Dutch hoe, so they never suffer the weeds to grow to any size before they cut them; in which they judge right: for when the weeds are small, one man will hoe as much ground in a day as can be performed by three, when they are permitted to grow large; and the weeds will be more effectually destroyed.

" They give a third hoeing to the plants, about five or six weeks after the second; which generally makes the ground so clean, as to require no more cleaning till the Carthamus is pulled up. When the plants begin to flower, and have thrust out their florets (or thrum) to a proper length, they go over the ground to gather it; and as it is from time to time gathered, it is dried in a kiln for use. There is usually a succession of flowers for six or seven weeks. After the crop is gathered, the stalks are pulled, and tied in bundles for fuel; and when they have been set up a few days to dry, they are carried off, and the ground is ploughed for wheat; which they say, always succeeds well after this plant.

" The good quality of this commodity is chiefly in the colour, which should be of a very bright saffron, and herein that which is cultivated in England often fails; for if there happens much rain during the time the plants are in flower, it will cause the florets to change to a dark or dirty yellow, which will also befal that which is gathered when there is any moisture remaining upon it; therefore great care must be taken not to gather it till the dew is quite dried off, nor should it be pressed together till it has been dried on the kiln.

" It is cultivated at present in many parts of Europe, and also the in Levant, whence great quantities are annually imported into England, for dyeing and painting.

" In Spain this plant is cultivated in their gardens, as *marygolds* are in England, to put in their soups, olios, and other dishes, to give them a colour. The Jews also are very fond of this, and mix it in most of their viands; and it is very probable they were the persons who first carried the seeds of this plant to America, and taught the inhabitants the use of it, for it is now as commonly used by the English there, as in any part of Europe."

" *Chemical properties of Carthamus.*—Many experiments have been made on the colouring matter extracted from this plant. The last and most interesting are those of Dufour and Marchoise, of which we shall present a short account. The *flowers* of the Carthamus contain two colouring matters; a yellow, which is soluble in water, and has hitherto been applied to no use; and a red, which is employed by the dyers, &c.; and which constitutes the pigment called *rouge*. The yellow colouring matter readily dissolves in water, but it is difficult to separate the whole of it. Dufour effected this by exposing the Carthamus wrapt up in a piece of linen to the action of a stream of water. To separate the red colouring matter, he macerated for an hour the Carthamus, after it had been thus washed, in a weak solution of carbonate of soda. Into this solution was put a quantity of cotton, and lemon-juice was then dropped into it till the liquid assumed a fine cherry-red colour. After standing twenty-four hours, the liquid had its red colour, the whole colouring matter having combined with the cotton, and dyed it red. The cotton was taken out and well washed, to separate a little of the yellow colour adhering to it. It was then put into a very dilute solution of carbonate of soda. This alkali separated the colouring matter from the cotton, dissolved it, and assumed a yellow colour; the cotton being removed and lemon-juice dropped into the solution, a fine rose-coloured powder gradually separated, and at last precipitated. This was the red colouring matter. This red colouring principle is soluble in alcohol and ether. The alkalies also dissolve it, but destroy its colour. When distilled, it yields a little water, scarcely any gas, a little oil, and a portion of charcoal, equal to one-third of the original weight. When this charcoal is burnt it leaves no ashes; 1000 parts of Carthamus yields only five of this colouring matter, but no less than 268 of the yellow colouring matter above mentioned. Carthamus also contains a great variety of other substances, according to Dufour, many of which, such as alumina, sand, &c., are evidently foreign. It is probably in some such manner as the above that the *pink saucers* are prepared from Carthamus, though we believe the exact process is kept a secret.

"This plant may be admitted to have a place in the borders of large gardens, where it will add to the variety, during the time of its continuance in flower, which is commonly two months, or ten weeks; for if the seeds are sown in the beginning of April, the first flowers will appear in the middle of July at farthest; and there will be a succession of flowers on the side branches, till the end of September, and in a cold season till the middle of October, during which time the plants will not be destitute of flowers; which being of a bright saffron colour, make a pretty appearance; and if the plants are supported, to prevent their being broken, or blown down by the wind, they will not interfere with the other flowers, because these have a regular upright growth.

"When they are cultivated for this purpose, the seeds should be sown in the places where the plants are designed to remain, because they do not bear transplanting well; therefore three or four of the seeds should be sown in each patch, lest any of them should fail; and when the plants are grown so strong as to be out of danger, the most promising in each patch should be left, and the others pulled up, that they may not draw or injure those which are to stand."

What further illustration need we give of the value and excellency of this work? Shall we say that besides botany it treats of dairy, husbandry, and agricultural zoology, which means all the live stock that the farmer or the grazier is interested in a knowledge of? We now have, we think, persuaded the most incredulous, that if he possesses these volumes he may content himself under the idea that all that is known up to the present time in the various subjects which form the Dictionary is presented to him.

DESCRIPTION OF THE PLATES.

CORONILLA EMERUS. Var. *a.*

SCORPION SENNA.

Diadelphia Decandria.

Leguminosæ.

Gen. Char.—Calyx two-lipped; two-three upper, teeth connate; vexillum scarcely longer than alæ. Loment round, jointed, straight.

Spec. Char.—Peduncle about three-flowered. Claws of corolla three-times as long as calyx. Stem angular.

Authors have given to this plant the name of *Scorpion Senna*, its seed-vessels, from their slender and jointed appearance, bearing some resemblance to the tail of a scorpion.

It is a native of France and Germany, and a very old inhabitant of our gardens, having been cultivated by Gerard in 1596; it is of low and slow growth: there is a shrub of it in the Apothecaries' Garden, Chelsea, which grew there in the time of Miller, and which now is not more than five feet high.

In the nurseries we have observed two varieties of it, one in which the flowers have been tinged with bright red inclining to orange, and which is by far the most common, the other with flowers wholly yellow, scarcely worth cultivating.

Its blossoms are produced in May and June, and sometimes again in autumn; neatly trained to a wall or paling, it makes a beautiful appearance when in flower; the shortness of its shoots renders it a very proper object for this purpose.

Is propagated by seeds, layers, and cuttings; the first are not produced in any great plenty with us.

The leaves, by a proper fermentation, are said to produce a dye like that of indigo.

MESEMBRYANTHEMUM SPECTABILE.

SHOWY OR GREAT PURPLE-FLOWERED FIG MARIGOLD.

Icosandria Di-Pentagynia.

Ficoideæ.

Gen. Char.—Calyx five-cleft. Petals many, linear. Capsule turbinate, fleshy, inferior, many-seeded.

Spec. Char.—Leaves glaucous, three-cornered, very rough. Brateas ovate, acute, embracing the peduncles upwards.

This is a shrubby plant, not erect. Branches opposite and alternate; axillary, rather crowded, generally ascending, but sometimes almost decumbent; whilst young, stout, greenish or purplish green, and angular; when old, long, brown, woody, strong and cylindrical. Leaves of different lengths, according to their own ages and that of the plant, from two to five inches long, and not a quarter of an inch broad. The young leaves usually ascending, incurved, very glaucous, with pellucid, very numerous, well defined punctures: the old ones expanding or recurved, glaucous, and dotted; all opposite, connate, and swelled just below the base, where they unite; are awl-shaped above, slightly compressed, with the angles very entire. Flowers solitary, very large and specious, bright purple, making a fine contrast with the very glaucous leaves and deep brown branches.

Of this tribe there are species whose flowers are superior in size and brilliancy of colour, to the present, whose leaves are more remarkable for the singularity of their form; yet, in point of ornament, this, perhaps, is of all others the most desirable, as it continues to produce its fine large purple flowers during the whole of the summer, is of ready growth, and raised without difficulty from cuttings.

ERICA EMPETRIFOLIA.

CROWBERRY-LEAVED HEATH.

Octandria Monogynia.

Ericeæ.

Gen. Char.—Calyx four-leaved. Corolla four-fid. Filaments inserted into the receptacle. Anthers bifid. Capsule four-celled, four-valved, many-seeded.

Spec. Char.—Anthers bearded; style exserted. Corolla campanulate. Flowers whorled. Leaves six-linear, hairy.

It is a most pleasing circumstance, when plants afford characters by which they may, with certainty, be distinguished: most of the *heaths* are of this kind, and the present one in particular: exclusive of its great peculiarity of growth, so obviously expressed in our representation of it, its flowers diffuse a strong honey-like fragrance, which, if other characters were wanting, would at once discriminate it.

Heaths require a good deal of air and light, and therefore should be placed near the glass, and near such glass as may be opened to admit air every mild day in the year. They are usually propagated by cuttings.

PHLOX SUBULATA.

AWL-LEAVED PHLOX.

Pentandria Monogynia.

Polemoniaceæ.

Gen. Char.—Capsule three-celled. Corolla hypocrateriform, with a curved tube. Stigma trifid.

Spec. Char.—Leaves fasicled, subulate, pungent, ciliated. Pedicels few, terminal.

Left to itself its stems trail on the ground; the young shoots are of a reddish hue, and slightly villous; the leaves are edged with hairs, subulate, opposite, recurved, and rather fleshy, producing others from their alæ, becoming, as the plant grows old, of a brownish colour, which renders the plant in some degree unsightly; the flowers are produced from one to there or four in an umbel, drooping before they expand; the calysic are villous, the flowers pale purple or flesh colour, envenadle by an eye of dark but brilliant purple disposed in a star-like form; antheræ yellow.

The flowers are extremely pretty, but delicate, requiring the shelter of a hand-glass, or greenhouse, during the period of their blossoming, which is the beginning of May; they are of shorter duration than in most of the other species.

This hardy herbaceous plant is a native of Virginia, and should be renewed frequently by cuttings, which strike readily; it may be suffered to grow either in its natural procumbent way, or be made to appear to more advantage by training it to a stick.

ROSA MUSCOSA.

MOSS ROSS.

Icosandria Polygynia.

Rosaceæ.

Gen. Char.—Calyx urceolate, five-cleft, fleshy, contracted at orifice. Petals five. Grains bony, hairy, included in fleshy tube of Calyx.

Spec. Char.—Calyxes and peduncles mossy.

If there be any one genus of plants more universally admired than the others, it is that of the *Rose*. Where is the poet that has not celebrated it? where the painter that has not made it an object of his imitative art?

In the opinion of Miller, the *Moss Rose*, or Moss Province, as it is frequently called, is a perfectly distinct species; Linnæus considers it as a variety only of the *centifolia*: as it is found in our nurseries in a double state only, and as we are ignorant of what country it is the produce, the decision of this matter must be left to future observation and inquiry.

Though it may no tincrease so fast by suckers, nor be increased so readily by layers as the *centifolia*, there is no difficulty in propagating it either way; the latter mode is usually adopted.

CAMELLIA JAPONICA. VAR. Splendens.

SPLENDID CAMELLIA.

Monadelphia Polyandria.

Camellieæ.

Gen. Char.—Calyx imbricated, many-leaved, the inner leaflets largest.

Spec. Char.—Leaves ovate, acuminate, acutely serrate. Flowers terminal, sub-solitary.

This beautiful variety of cammelia is much admired for its fine form, rich clothing of shining deep green foliage, and elegant red flowers; and is deserving a place in every collection of greenhouse plants. It is propagated by cuttings, layers, and seeds, for stocks.

PULTENÆA DAPHNOIDES.

DAPHNE-LEAVED PULTENÆA.

Decandria Monogynia.

Leguminosæ.

Gen. Char.—Calyx five-cleft with even-sized lips. Two-bracted. Ovary sessile. Two-seeded. Style subulate, ascending. Stigma simple. Appendage of the seed with hind lobes, cut.

Spec. Char.—Heads terminal. Leaves obovate, oblong, flat, quite smooth, three times as long as broad. Point pungent.

It is a hardy greenhouse New Holland plant, generally flowering about the month of May; but the blossom is of short duration. It is however one of the handsomest of the genus and is now rather common in our greenhouses. Sand& peat is the soil it most approved; and its increase is produced either from seeds, which sometimes ripen with us, or from cuttings placed in a gentle heat about the month of May.

THUNBERGIA GRANDIFLORA.

LARGE-FLOWERED THUNBERGIA.

Didynamia Angiospermia.

Acanthaceæ.

Gen. Char.—Calyx double. Outer two-leaved. Inner about twelve-toothed. Corolla campanulate. Capsule beaked, two-celled.

Spec. Char.—Leaves angular. Cordate. Inner calyx none. Anthers bearded, spurred.

Stem Shrubby, climbing. Leaves petioled, angular, cordate, opposite. Calyx a two-valved spathe. Valves roughened with small black points, ovate, oblique, with the upper margins, straight. Corolla large, bright blue, streaked. Tube conical, contracted upwards, then largely dilated into a bell-shaped faux, vaulted on the upper side, and convex on the lower. Limb five-lobed, lobes rounded, spreading, two upper ones erect, lower one somewhat the largest. Stamens four, longer pair much curved at the bottom; shorter pair compressed, gibbous. Anthers bearded. Germen conical. Stigma concave.

This beautiful plant is a native of Bengal, and requires to be kept in the stove, where it grows luxuriantly, and flowers freely. It is readily propagated by cuttings.

CRINUM SPIRALE.

SPIRAL-STALKED CRINUM.

Hexandria Monogynia.

Amaryllideæ.

Gen. Char.—Flower funnel-form, half six-cleft, with a filiform tube, and a spreading recurved limb. Sepals subulate, channelled, fleshy.

Spec. Char.—Leaves filiform, spiral. Petals acute, coloured outside.

Bulb about the size of a sparrows egg. Leaves four or five, two-three inches long, very slender, deep green. Scape somewhat higher than these, as well as them enclosed at the base within a membranous rootsheath, flexuose about the middle with two bags or bendings; pedicles from an inch and a half to about two inches long. Anthers yellow, three alternate ones exploding before the rest.

This curious little plant is a native of the Cape of Good Hope, and is a very hardy bulb, requiring no more protection than a pit to secure it from the frost.

It increases but slowly by the root, but occasionally produces ripe seeds; and should be kept constantly in its pot, in a mixture of loam and peat.

CYRTOCHILUM UNDULATUM.

UNDULATE-LEAVED CYRTOCHILUM.

Gynandria Monandria.

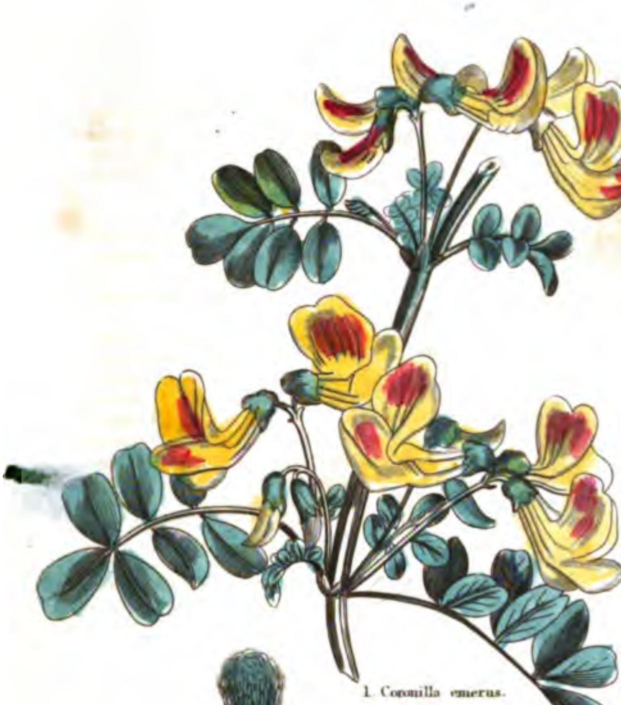
Orchideæ.

Gen. Char.—Labellum convex. Anthers terminal. Pollen masses two-cereaceous.

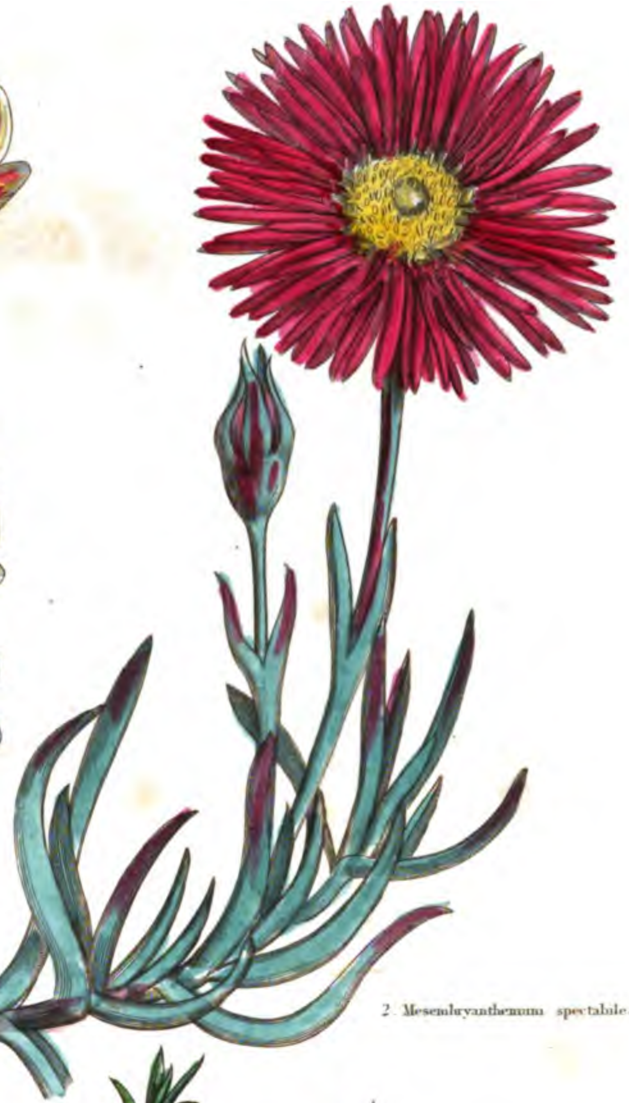
Spec. Char.—Colycine leaflets undulate, ovate, patent.

Bulb oblong. Leaves lanceolate-oblong, acute, subcoriaceous. Scapes branchy, smooth, panicled. Flowers stalked. Calyx patent-smooth. Ovaarium costæte, smooth. Anther two-celled. Pollen masses oblong.

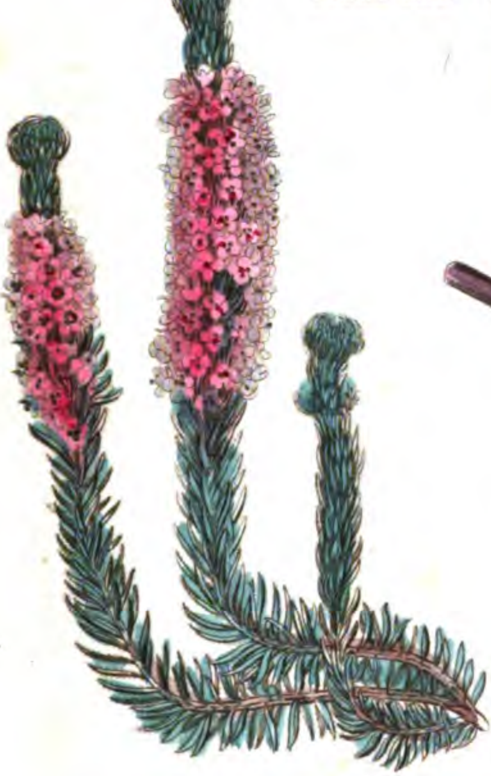
This beautiful and singular epiphyte is a native of South America, where it is found growing upon trees, vegetating upon the soil which collects upon the forks of the branches, and is readily propagated with us by dividing its stems, and planting them in pots filled with porous stones, a few decayed leaves, and knobs of bark taken fresh from the wood, but requires very little water.



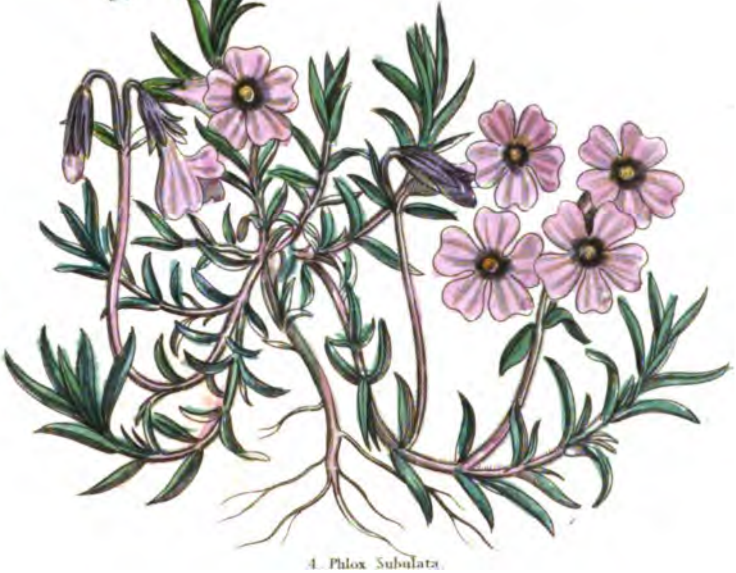
1. Coronilla emerus.



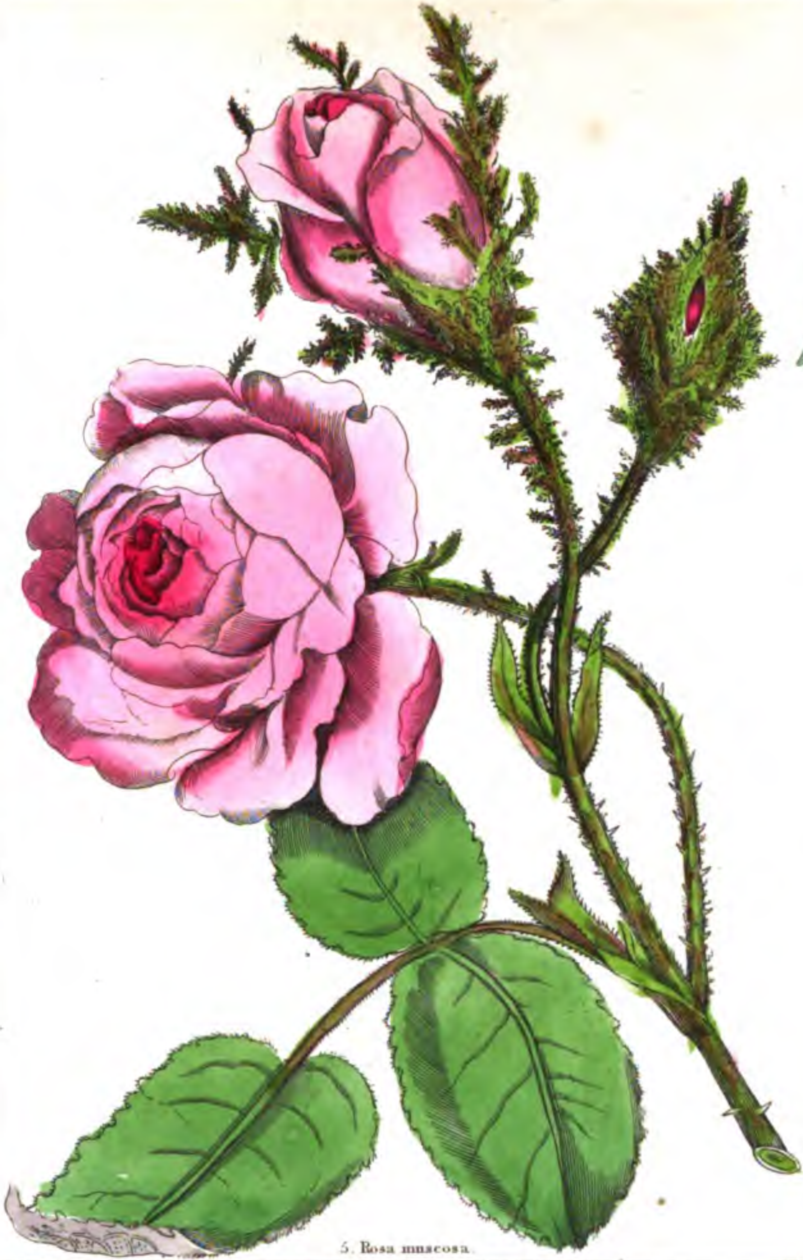
2. Mesembryanthemum spectabile.



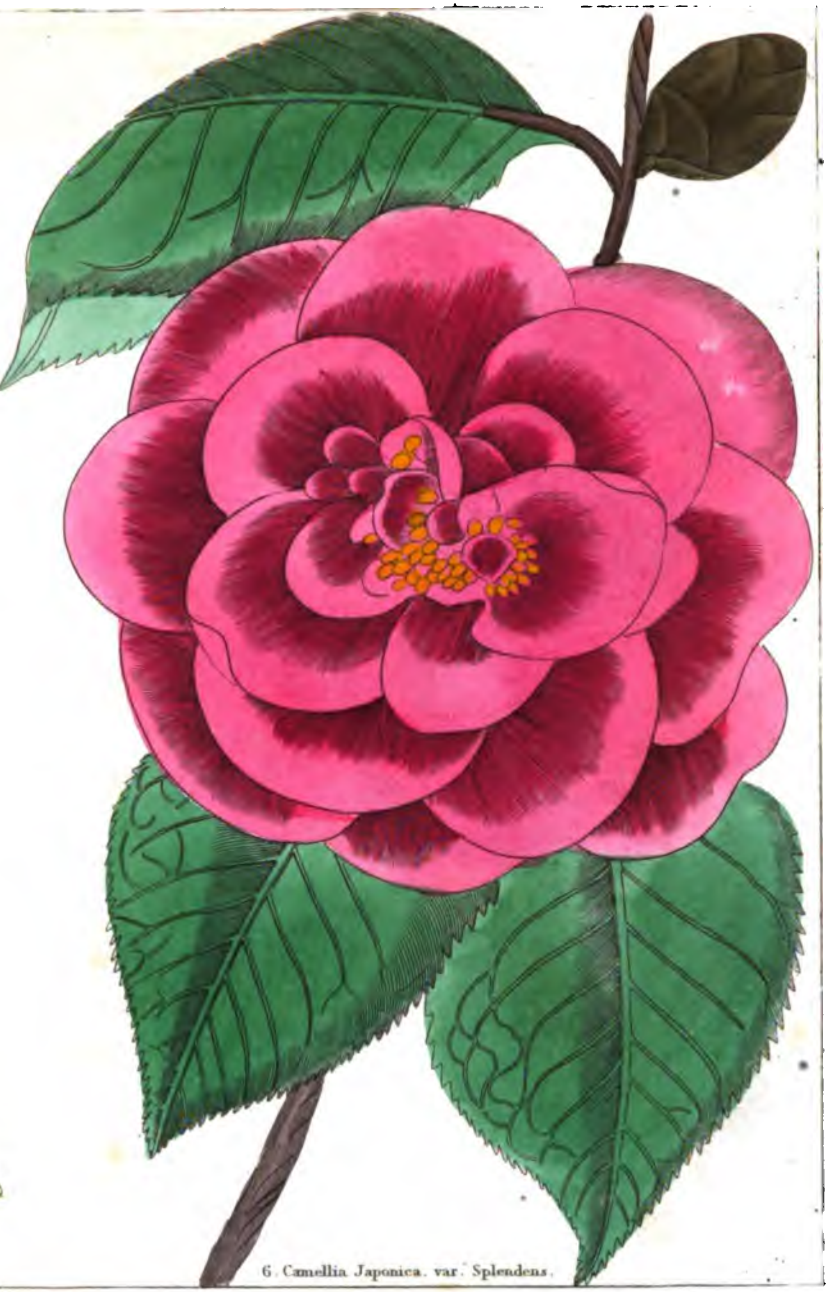
3. Erica Empetrifolia.



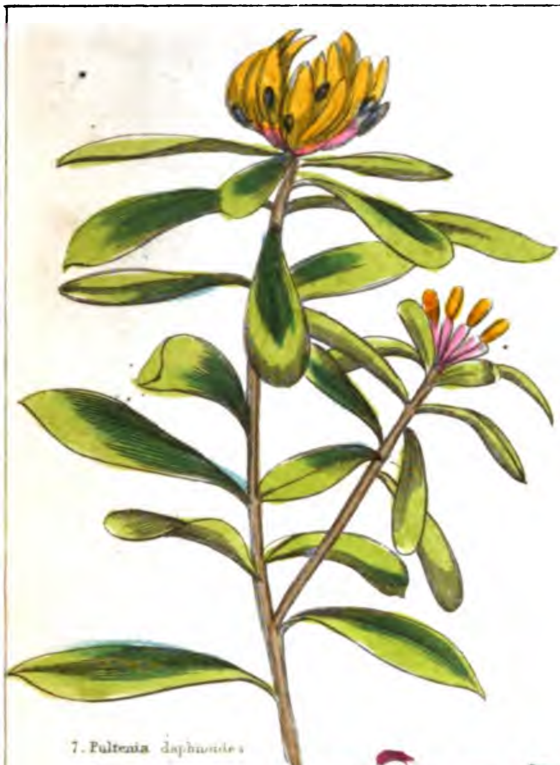
4. Phlox Subulata.



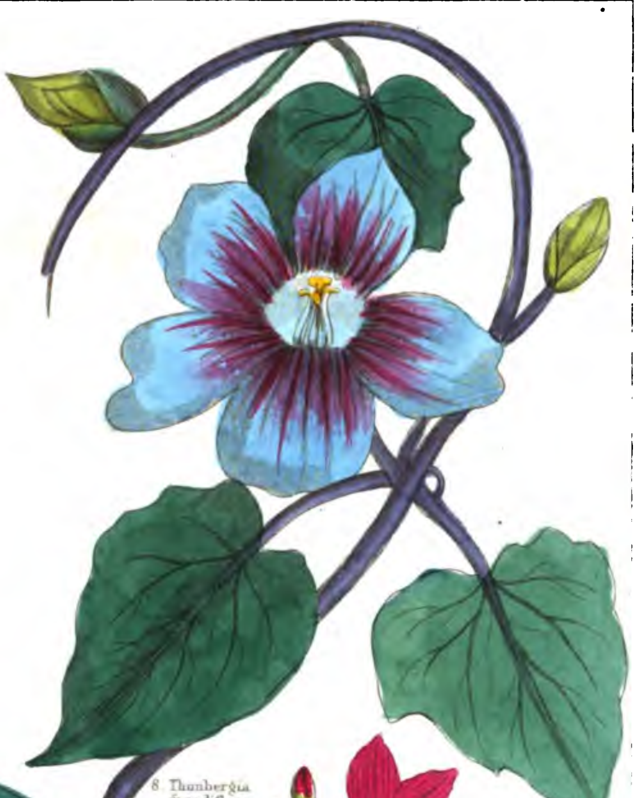
5. Rosa muscosa.



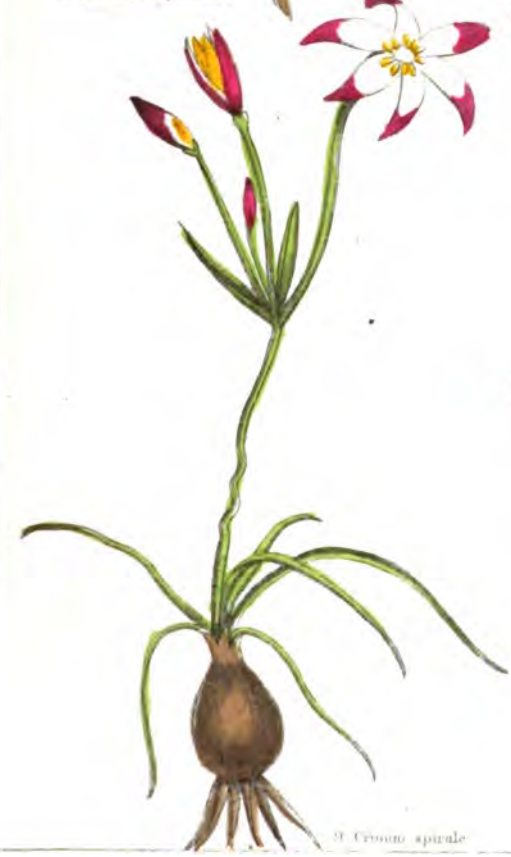
6. Camellia Japonica. var. Splendens.



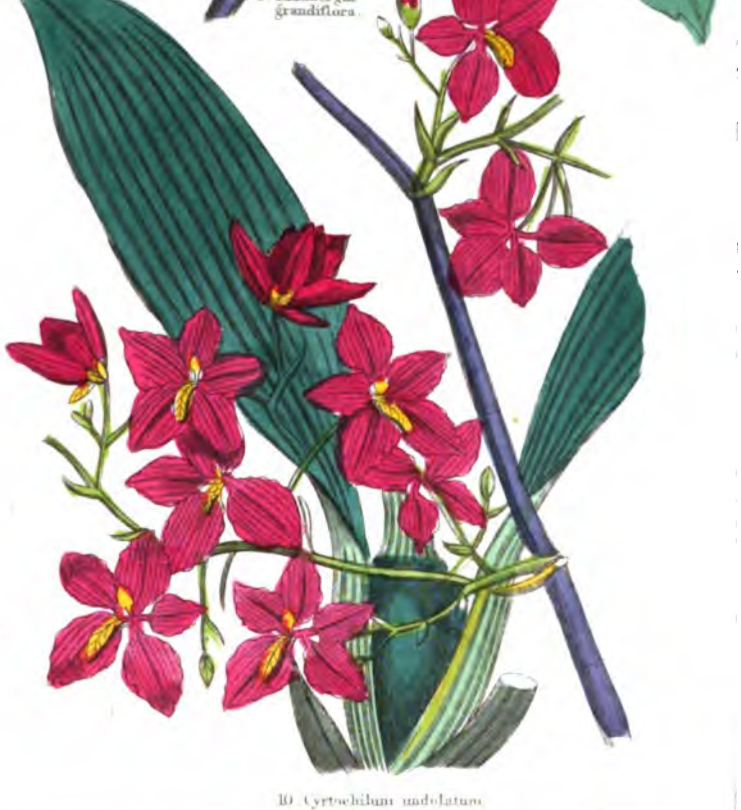
7. Pultenia daphnoides



8. Thunbergia grandiflora



9. Crinum spirale



10. Cyrtochilum undulatum

THE
MAGAZINE OF BOTANY, GARDENING,
AND
AGRICULTURE,
BRITISH AND FOREIGN.
JUNE, 1836.

ROYLE'S BOTANY OF THE HIMALAYAN MOUNTAINS.

THE Part of this work now before us, we think is an improvement in many respects upon its predecessors. The botanical notices are not so lengthy, and more interesting, and the plates are much better finished than those of many other portions of the work. Among a numerous variety of descriptions of useful or interesting plants, we take the following, of the Genera Rheum (Rhubarb).

"The genus *Rheum*, or Rhubarb, so important in a commercial point of view, is more interesting than any other in its geographical distribution. *R. Rhaponticum* is found in several parts of Russia, on the shores of the Bosphorus and of the Caspian Sea, eastwards in Siberia, and the lower mountains of the Altai Range: *R. sibericum* and *undulatum* of Pallas are considered by Ledebour to be only varieties of this. *R. leucorhizum* (*nanum Sievers*) is also found in the Altai mountains and the deserts of the Kirghis. Neither of these afford the Rhubarb of commerce, which is not found within the Russian territories, but well known to be brought by the Chinese to the Russian frontier town of Kiakhta, according to the treaty formed between these powers in 1772. The Chinese obtain the Rhubarb produced in China Proper, from that part of the province of Shensee, now called Kansu, situated between N. lat. 35 deg. and 40 deg. But the best, according to the Missionaries, who say it is called *Tai-hoang*, in the province of Setchuen, from the mountains called Sue-chan, or of snow, which extend from North lat. 26 deg. to 33 deg., and from about 100 deg. to 105 deg. of E. longitude. That from the latter province probably forms much of what is called China Rhubarb: the Missionaries met large quantities of it brought down in the months of October and November. That from Kansu may afford some of what is called Russian Rhubarb; but both Pallas and Rehman have ascertained that the greater portion, if not the whole of this, is obtained in April and May, from the clefts of rocks in high and arid mountains surrounding lake Kokonor. Bell also learnt that it was the produce of Mongolia, and Marco Polo of Succuir, in Tanguth. Dr. Rehman ascertained that the trade is in the hands of one Bucharian family, who farm the monopoly from the Chinese government, and reside at Si-ning, a Chinese town on the very frontiers of Tibet, 3,000 verstes from Kiakhta, and twenty days' journey from *Kian-sin*, and *Schan-sin*, Tangutian towns, where the Bucharians go to purchase rhubarb. This would bring the rhubarb country within 95 deg. of E. long. in 35 deg. of N. latitude, that is into the heart of Tibet. As no naturalist has visited this part, and neither seeds nor plants have been obtained thence, it is as yet unknown what species yields this rhubarb. Pallas thinks it may be *R. compactum*, as the leaves are said to be round and toothed; the rhubarb merchants, to whom he showed the plant, did not know *R. palmatum*. Both these were obtained from China and Tatary, as well as *R. tataricum* and *undulatum*. It is probable, therefore, that some of these yield a portion of the rhubarb of commerce, as they have some of very good quality, when cultivated in England and France. But as it is improbable, from the nature of the country, that the best rhubarb is confined within very narrow limits, it becomes interesting to ascertain how near it approaches the British territories in India, in order to share in the trade, or attempt the cultivation.

"That this might very reasonably be undertaken within the British territories, will be apparent from the distribution of rhubarb in the Himalayas. Passing from Hindookhoosh, where is found *Rheum Ribes* (ribas of the Persians), mentioned by Chardin, &c., more recently by Lieut. Burnes, who also met with rhubarb at Caubul and Bokhara; we find rhubarb common in the Himalayas, as on Choor, near Jumnotree, on Jacho in Kemaon, Gossainthan in Nepal, and near Tassisudon in Butan, that is from 30 deg. to 27 deg., and from E. long. 79 deg. to 89 deg., and at elevations of 9,000 and 10,000 feet. Mr. Moorcroft discovered rhubarb at Niti, and next day between Niti and Gotung, that is at elevations of 12,000 feet. His companion, Major Hearsay, thought he saw three kinds, and has described two of them to me, one round-leaved and long-stalked, and the other short-stalked, but large and broad-leaved (*R. Moorcroftianum* nob.), with the root more purgative than that of the former. These are called *doelooh* or *dooloo* by the Bhoteas, and *tantara* (Web), *rantra* (Hearsay). One of these appears to be the rhubarb described by Dr. Meisner under the name *R. Emodi* (*R. Webbianum*, nob.), which differs from the original *R. Emodi*, described by Mr. Don under the name *R. Australe*. If we turn our attention to the northern face of the Himalaya, which has so many features of a Tatarian climate, we find *R. spiciforme*, nob., discovered by Mr. Inglis on the Kherang Pass, and at several places beyond. Dr. Gerard describes the table-land of Tatary as covered with rhubarb, at elevations of 16,000 feet. Mr. Moorcroft sent some rhubarb, which for compactness of texture, colour, and properties, was as fine as any I have ever seen, from near Ludak, in N. lat 34 deg., and E. long. 77½ deg.

"But these are only the western boundaries of the elevated, cold, and bleak regions, known under the names of Tatary, Mongolia, and Tibet, of which Kunawur is essentially a part, participating in the same great physical features, climate, and vegetation; already possessing one, if not two species of rhubarb, and having the best growing in its immediate vicinity. There can therefore be no rational doubt about the successful cultivation of the true rhubarb in territories within the British influence, as in Kunawur, or the Bhoteah pergunnahs of Kemaon, and that with little more labour than placing the roots or seeds in favourable situations, and this in a country where little else can be produced fit for export. The only difficulty will be to obtain specimens or seeds of the true rhubarb. But it must be considered, that even the eastern boundaries of the country producing the best rhubarb, and which, to make their purchases, the Chinese reach, after a journey of twenty days, is only one half the distance from the British territories in Upper Assam, that it is from the Russian town of Kiakhta. Also, that there is reason for supposing rhubarb may be found much further to the westward, and consequently still nearer to the Himalayas. It would not therefore be difficult from Kunawur, or Upper Assam, or for such active and intelligent officers as Messrs. Traill and Hodgson, in Kemaon and Nepal, to obtain some of the seed or roots. They might at the same time succeed in establishing a trade in rhubarb with Tibet, or Western Mongolia, by means of the Tatars who resort to the Hill Fairs. This trade might easily be encouraged by the government purchasing all the rhubarb it requires, which might thus be employed for hospital use after crossing the frontiers, instead of as now, after making a journey of 20,000 miles, or nearly the circuit of the globe.

"Even this would not probably be so difficult as at first sight appears, for the whole of the Tatarian rhubarb trade is not engrossed by the Russians, as much of it takes a western direction, and has always formed one of the imports from China into Bokhara, whence passing to Smyrna, it is known in Europe as Turkey rhubarb. Chardin, treating of that known in Persia states—'La meilleure vient du pais des Tartares Orientaux qui sont entre la Mer Caspienne et la Chine.' (Voyages, ii. p. 12.) Rhubarb also of the best quality, and closely resembling the Russian, is to be purchased in the bazars of N. India, under the name *reuund-khatai*, from the old name *Cathay*, of Northern China. This is sold for ten times the price of the Himalayan rhubarb, which makes its way into the plains of India through Khalsee, Almora, and Butan, and is probably from its usual dark colour and spongy texture, the produce of either or both *R. Emodi* and *Webbianum*. The roots of *R. spiciforme* and *Moorcroftianum* are lighter-coloured and more compact in structure. Rhubarb is, in India, commonly denominated *reuund-cheenee* (*rivend-tchini* in Persia, *Chardin*), with *rawund* assigned as its Arabic, and *reon* (*ρηον*) as its Greek name. The above are evidently the *rewund* of Avicenna, and the *raued-seni* of the translators of Mesue. Three kinds are described, in Persian works on Materia Medica, 1. *Cheenee*; 2. *Khorassanee*; 3. *Hindee*.

"The roots of rhubarb we have seen to be pretty uniform in secreting the peculiar principle called *Rhabarbarin*, possessing properties which make them useful as purgative medicines; but these are also accompanied by astringent properties, while the stalks secrete acid, chiefly acetic and tartaric, with oxalate of lime (Fée), oxalic acid, (Turner); this is most fully developed in Sorrel (*Rumex Acetosa* and *Acetosella*), while the astringent principle dependent on the presence of gallic acid and tannin, in many of the roots of the *Polygoneæ*, is most fully secreted in *Coccoloba uvifera*, and 'so powerful as to rival gum kino in its effects.' (Lindley.) Some of the *Polygonums* are however, acrid, as *P. Hidropiper* and *acre*, and others, as *P. tinctorium*, *chinense*, and *barbatum*, yield a blue dye like indigo in Cochin-china, China, and Japan. The albumen of *Polygoneæ* being farinaceous, and in some considerably developed, has been used for food, as Buckwheat, *Fagopyrum esculentum*, and *tataricum*, cultivated in many parts of Europe, and in the Himalayas with *P. emarginatum*. The two first are no doubt originally inhabitants of the mountains of Central Asia, and were first known in Europe under the name of 'frumentum Sarracenicum.' Both are much cultivated in Russia and Siberia; the first is usually preferred in other parts of Europe, but the second grows in every soil, and requires less time; Professor De Candolle says it is preferred to *F. esculentum* in Piedmont in the Luzerne valley, because it ripens quicker, and therefore in late years, and at higher elevations in the Alps. In the Himalayas, *Eagopyrum esculentum* (*phaphra* and *kooltoo* of the natives) is also most commonly cultivated, but *F. emarginatum* (*ogla*) which comes very near the Linnean specimens of *F. tataricum*, is preferred in higher and drier climates, as in Kunawur. Thus the more closely we examine the distribution of plants and the agriculture of different countries, the nearer do we observe the correspondence in practical results among those which participate in the same peculiarities of climate; and we cannot but admire the bounty of Nature, which affords even in what appear sterile wastes, some article fitted for the food of man, and suited to the climate, with others which are adapted for commerce, as Buckwheat, Borax, Musk, and Rhubarb, from the three kingdoms of Nature, in the cold, bleak, and arid plains and mountains of Tatary.

"*Polygonum vaccinifolium*. Wall. Pl. As. Rar. iii. p. 54.—Tab. 80. fig. 2.

"*P. Brunonis* Wall. l. c.—Tab. 80. fig. 3.

"*Rhei Himalenses.*

* racemis paniculatis.

"*Rheum Emodi*. Wall.—*R. Australe*. Don. Fl. Nep. p. 75. Sweet's British Flower Garden. Ic. 270.

"*R. Webbianum*; racemis axillaribus aggregatis, terminalibus paniculatis, pedicellis ternis fructu maturo dimidio brevioribus, sepalis integris late ovalibus obtusis, cariopsidis basi subcordato, apice integro v. subemarginato, foliis radicalibus amplis longe petiolatis cordato-acutis, caulinis obtusis, in venis subtus margineque hirtellis supra pilosiusculis, petiolis rotundatis, pedunculis ramisque superne rotundis glabris leviter striatis.—*R. Emodi*. Wall. Cat. 1727.—Emodus ad Gossainthan, et ex Niti, (*Webb.*) Wall. Pl. As. Rar. 3. p. 65.

"A few only of the specimens in the E. I. Herbarium correspond with the original *R. Emodi*, as figured and described by Mr. Don, *l. c.* under the name *R. Australe*.—Tab. 78^{a}. fig 1.—(*a*) Flower opening; (*b*) the same, with the segments of the perianth cut off; (*c*) stigma; (*d*) fruit.

** racemis radicalibus spiciformibus.

"*R. spiciforme*; racemis radicalibus spiciformibus, pedicellis, plurimis aggregatis fructu maturo subæqualibus, sepalis oblongis obtusis alternis angustioribus petaloideis, cariopsidis basi apiceque rotundatis, foliis crassis coriaceis cordato-obtusis subtus rubris reticulato-venosis utrinque stellato-pubescentibus, petiolis pedunculisque glabris.—Tab. 78.—(*a*) Flower seen from above; (*b*) from below; (*c d*) fruit; (*e*) pistil.

"*R. Moorcroftianum*; Wall. E. I. Herb. n. 1727, marked 'small-stalked rhubarb.'

"I do not possess specimens of this species, but the most cursory examination will shew that it does not belong to *R. Emodi* or *Webbianum*, and that it is also distinct from, though allied to *R. spiciforme*."

We have further on, in this splendid Part before us, an interesting account of the Laurel, which we must extract.

"The Laurel, famed for its employment in crowning poets, philosophers, and heroes, in ancient, and figuratively so, in modern times, has given its name to this rich and valuable family, which is abundant in the hot parts of Asia and America, but (except *Cassytha*) absent from the continent of Africa. Like other tropical families, the *Laurineæ* send a few species northward, as *Laurus nobilis*, the Sweet Bay, to the S. of Europe; *L. indica*, Royal Bay, to Teneriffe and Madeira; *Camphora* to Japan; *Sassafras* and *Benzoin* to North America; and southwards to New Holland, species of other genera. In Asia, the *Laurineæ* extend northwards from the tropical islands along the Malayan Peninsula to China and Japan, and from Ceylon into the Indian Peninsula, where they ascend to elevations of 2,000 and 3,000 feet on the Dindigul, and probably higher on the Neelgherry mountains. From Silhet species extend all along the base of the Himalayas, even to near the banks of the Sutlej, and ascend elevations of 7 000 feet, in 30 deg. of N. latitude. The majoritiy of species of this family were formerly referred to the genus *Laurus*; but Professor Nees Von Esenbeck, in an elaborate monograph on the East-Indian species, published in Dr. Wallich's Pl. As. Rar. vol. ii. and iii., has formed a number of new, and circumscribed the old genera. Of the former, *Polyadenia*, *Tetradenia*, *Cylicodaphne*, *Actinodaphne*, *Beilschmeidea*, *Cecidodaphne*, and *Alceodaphne*, are confined to the southern parts of India, and from Silhet along the Malayan Peninsula. *Endiandra* and *Cryptocarya*, two of Mr. Brown's New Holland genera, are also found in Silhet and Pundua. *Gyrocarpus* is found on the coasts of India, as well as of Asia generally, of New Holland and of S. America; the species are distinct. The anomalous *Cassytha*, sometimes separated into an order, occurs in the same countries, as well as in Africa. *Daphnidium*, *Dodeca*-

denia, and *Machilus*, extend to more northern latitudes along and on the Himalayas in Nepal, Kemaon, and Sirmore. *Machilus odoratissimus* is found as high as Mussooree, and another species on the Neelgherries. *Ocotea*, common in S. and N. America, with one or two species in the island of Madeira, extends from Silhet to the Deyra Doon, and ascends to 7,000 feet. *Tetranthera*, found in China and New Holland, is so almost every where in the warm parts of India, *T. apetala* and *Roxburghiana* extending up to the Doon.

"*Benzoin*, so called, because *B. odoriferum*, with a stimulant and tonic bark, smells of Benzoin, with three species in N. America, has also one, *B. Neesianum*, in Nepala, of which the berries smell strongly of Cajeput oil. *Camphora*, of which the officinal species yields the camphor of China and Japan, inferior to that of Sumatra, v. p. 106, has one species, *C. Paythenoxylon*, in Penang and Sumatra, which yields an oil useful in rheumatic affections, and has an infusion of its roots drank as sassafras; with another, *C. glandulifera*, in the mountains of Nepal, containing camphor in its wood. *Cinnamomum*, the most numerous in species, contains also the most valuable plants, as *C. zeylanicum*, the Cinnamon of Ceylon, yielding one of the most valuable articles of a very ancient commerce, of which the coarse kinds are said by Mr. Marshall to be the common *Cassia*. The natives of India call the former *darsheenee*, and assign *akimoona* (*κινομον?*) as a Greek name, from Persian works on Materia Medica. It is only produced good on the S. and E. of Ceylon, in a sandy soil. Dr. Davy states, 'that the garden is nearly on a level with the lake of Colombo; its situation is sheltered, the climate is remarkably damp, showers are frequent, and the temperature uncommonly equable.' The cultivation has been commenced in Travancore and Tinnivelly, and would probably succeed in some of the territories acquired from the Burmese. *C. aromaticum*, cultivated in the South of China, affords the cinnamon of that country, which is reckoned superior to that of Ceylon by Loureiro and M. Poivre (Fée). *C. Culitlawan*, of Amboyna, yielding the *selackal* or *sindoc* bark, which appears to be the *suleekhe* of the Arabs (*selicha* of Mathiolus, *salichacha*, Avic. Trans.); has *islioos* assigned as the Greek name; I know not of what word this can be a corruption; it has no resemblance to *Cassia*. In Hindee it is called *kuhela*, and considered the produce of the *Tuj*, v. infra. Another wood of a dark red colour, is described under the name *kusela*, as the produce of Nubia, and of which the plant is said to be like that of *suleekhe*, but the seed to resemble that of *hilm* (*Balsamodendron*). Can this have caused some of the confusion in the old descriptions of Cassia? Another famed product is the *Bay-leaf* of India, the *Malabathrum* of the ancients, for which *malatroon* is assigned as the Greek name in Persian Materia Medica, and of which *Tamalapatra* (Tamala leaf) is given as the Indian synonyme by Garcias, of which he says 'Græci et Latini imitantes corrupte *malabatrum* nuncuparunt,' and which he describes under the name 'Folium,' simply. This, in India, is called *tej-pat*, the leaf of the *tej* or *tuj* (with *putruj* as that of the bark), a name which Dr. Hamilton found applied to *Cinnamomum Tamala*, growing in Rungpore and Silhet, and Dr. Roxburgh, as well as myself, to *C. albiflorum*, very nearly allied to the former, and growing along the foot of the mountains in the vallies, from Rungpore to the Deyra Doon, in 30 deg. of N. latitude. Both yield the leaves called by the Arabians *saduj-hindee*, which form so extensive a commerce, and from very ancient times. The leaves of *C. eucalyptoides malabathricum*, (Roxb.) have a strong smell and taste of cloves, with a slight tincture of camphor. *C. nitidum*, *coolit-manes* of Sumatra, has bark with the smell and taste of cinnamon. *C. Kiamis* of Java, is also remarkable for both. Some species are peculiar to the Peninsula, and one, according to Dr. Hamilton, yields a kind of *Cassia* in Canara. The wood of *Tetranthera apetala* and *Roxburghiana*, called *mueda-lukree*, is applied to wounds and bruises. It is a little astringent, with a degree of balsamic sweetness (Roxb.); and is used by the hill-people as a cure for diarrhœa. The leaves are eaten by a kind of silk-worm (Wall).

"The aromatic and stimulant properties for which, from the above enumeration, it is evident the Laurel tribe are conspicuous, is owing to the presence in almost every part of a volatile oil, which, in its concrete state, or, according to Dr. A. T. Thomson, a higher degree of oxygenation, forms camphor. The essential is frequently accompanied with a fatty oil, most fully developed in *Tetranthera sebifera*; and also, it is supposed in *Persea gratissima*, the Avocado pear of the West Indies. Other species in S. America yield a warm and pungent stimulant oil. (Lindley). In addition to those already mentioned as the produce of Asia, *Laurus cupularis* forms the cinnamon of the Isle of France, *L. cinnamomoides* that of Santa Fé de Bagota, and *L. quixos* of Peru. As the bark of many contains tannin in conjunction with the aromatic principle, they are useful as tonics and febrifuges. The sassafras nuts of the London shops are the produce of *Ocotea Pichurim*. Laurel berries, formerly used in medicine in Europe, are still so in India, under the name *hub-ool-ghar*, with the Greek name Daphne corrupted into *zaknee* and *zafnee*. Thus we find the Asiatics, like Europeans, esteem that which is brought from a distance, even when they possess indigenous drugs of a more powerful nature."

The frequent extracts we have made from this work will shew in what light we regard the undertaking of Mr. Royle; and we have now only further to state that we wish him that success which his talented production is certainly entitled to.

Catalogue of the most Remarkable and Interesting Plants, Indigenous to Worcestershire, with their Habitats.

No connected and accurate catalogue of Worcestershire plants worthy the attention of the scientific botanist in the present day, being in existence, although scattered notices occur in various publications, w ehave endeavoured to procure an accurate list of them, and present our readers with the following, as a complete compendium of the botany of that county.

Hippuris vulgaris, Mare's Tail. Pools. Rare. Clifton-upon-Severn.

V. scutellata, Narrow-leaved Speedwell. Bogs on the Malvern Hills, especially at the western base of the Worcestershire Beacon. Rare.

Lemna gibba, Gibbous Duck-weed. Rare. On Bishop's Pool, Northwick.

Salvia verbenaca, Wild English Clary. On the bank by the road side, at Red Hill, near Worcester.

Valeriana rubra, Red Valerian. On the wall close to the western entrance of Worcester Cathedral, 1826. The plant has since disappeared, probably by the ruthless hand of some exterminator.

Iris fœtidissima, Stinking Iris, or Gladwyn. Near Alfrick and at the western base of Crookbarrow Hill.

Cladium Mariscus, Prickly Twig-rush. Feckenham Bog.

Cyperus nigricans, Black Bog-rush. Feckenham Moors.

Scirpus cæspitosus, Scaly-stalked Club-rush. Bromsgrove.

S. pauciflorus, Chocolate-headed Club-rush. Reservoirs near Stourbridge.

S. maritimus, Salt-marsh Club-rush. Ditches about Badsey.

E. acicularis, Least Spike-rush. Bogs at the foot of the Malvern Hills, in several places.

Phalaris canariensis, Manured Canary-grass. Near Gregory's Mill, Worcester.

P. arundinacea, Reed Canary-grass. Banks of the Severn, Kemsey, &c.

Melica nutans, Mountain Melic grass. In Bewdley Forest, not far from Dowles Brook.

F. sylvatica, Slender Wood Fescue-grass. Perry Wood, Shrawley Wood, &c.

B. asper, Hairy Wood Brome-grass. Perry Wood.

A. Epigejos, Wood Reed. Eastern side of Perry Wood.

A. Calamagrostis, Small Reed. Pensnet Reservoir, near Stourbridge.

Scabiosa, succisa, Devil's bit Scabious. Moist pastures near Worcester.

S. columbaria, Small Scabious. On Bredon Hill.

Plantago Coronopus, Buck's-horn Plantain. On the conglomerate rock near the Giant's Grave, Habberley, near Kidderminster.

Sanguisorba officinalis, Great Burnet. Very rare. In moist ground at the south west side of Nunnery Wood.

Alchemilla vulgaris, Common Ladies' Mantle. A very elegant plant. Lane leading to Henwick Mill.

A. arvensis, Field Ladies' Mantle. Lanes about Henwick, and Malvern Hills.

P. pusillum, Small Pond-weed. Kemsey ford.

Mænchia erecta, Upright Mænchia. Rocks on the North Hill, Malvern.

M. arvensis, Field Scorpion-grass. Sandy bank between Hagley and Stourport.

Borago officinalis, Borage. Battenhall, near Worcester, and about Bromwich farm. At Lower Wick.

Echium vulgare, Viper's Bugloss. A fine showy plant, and not uncommon in the northern part of the county, but almost unknown in the southern. It sometimes gets on walls, as on Dudley Castle, where it appears in a very dwarfish state, but in fallow fields it becomes a yard in height.

P. veris Var., "Black Cowslip" of Dr. Abbot. A singular dark-flowered variety found in a field at Bromwich Farm, by Mr. Lees.

Menyanthes trifoliata, Buck Bean. One of our most beautiful native plants. In a pool on Hartlebury Common.

Hottonia palustris, Water Violet. Pool at Clifton-upon Severn.

A. tenella, Bog Pimpernell. A lovely plant. Bogs on the Malvern Hills.

C. Rapunculus, Rampion Bell Flower. Hindlip, near Worcester.

C. rapunculoides, Creeping Bell Flower. In a lane near Shrawley Wood.

C. glomerata, Clustered Bell Flower. Near Knightford's Bridge.

C. hederacea, Ivy-leaved Bell Flower. Very rare. On Hartlebury Common, according to the Rev. — Butt.

Jasione montana. Sheep's Scabious. In Shrawley Woods, and other sandy places.

Viola hirta, Hairy Violet. Lane leading from Kemsey to Green Street.—Dr. Streeten.

V. palustris, Marsh Violet. On Hartlebury Common, entangled with the bog moss, *Sphagnum palustre*. A delicate little plant.

Verbascum Thapsus, Great Mullein. Abundant about the Malvern Hills, and by the road sides in neglected spots.

V. Blattaria, Moth Mullein. In the vicinity of Malvern.

Hyoscyamus niger. Henbane. Side of the road beyond Spetchley, but most abundantly near Little Malvern, at the base of the Herefordshire Beacon.

R. Frangula, Berry-bearing Alder. Rare. In Wyre Forest.

Ribes rubrum, Common Currant. In places where it would seem improbable it could have been introduced from gardens. In the deep dingle of a wood at Hailstone Hill, near Suckley. Also in a ravine at Clifton-on-Teme, between that place and St. Catherine's Well.

R. nigrum, Black Currant. On the banks of the Severn in several places, but not producing berries.

Ulmus campestris, Common Elm. Worcestershire is famous for the abundance and excellence of its elm timber. It abounds in almost every hedge.

U. suberosa, Cork-barked Elm. Hedges near Hallow.

U. montana, Wych Hasel. About the base of Malvern Hills, &c.

U. glabra, Wych Elm. At Hindlip are some very fine trees of this kind.

Cuscuta europæa, Greater Dodder. Very rare. At Shipston-on-Stour.

Gentiana Amarella, Autumnal Gentian. On the wooded limestone ridge at the western base of the Worcestershire Beacon, Malvern.

Caucalis daucoides, Small Bur-parsley. Rufford.

Torilis nodosa, Knotted Hedge Parsley. Hedge side on the Spetchley road. Hedge, road side, near the Ketch, on the Bath Road.

Myrrhis odorata, Sweet Cicely. At Southstone's Rock.

S. angustifolium, Narrow-leaved Water-parsnep. Near Bransford Bridge, and at Powick Wier. Also by a pool near Bromwych Farm.

S. repens, Creeping Water-parsnep. On the Malvern Hills, among the trickling springs.

Sison segetum, Corn Honewort. Between Hanbury and Droitwich.

Œnanthe pimpinelloides, Parsley Water-dropwort. In some abundance in a meadow at the north western base of Crookbarrow Hill.

Œ. Phellandrium, Fine-leaved Water-dropwort. In a pool on Powick Ham.

Smyrnium Olusatrum, Common Alexanders. In great abundance at Hill Croome, and about Pershore.

Apium graveolens, Wild Celery. Abundant by the side of the Droitwich Canal, the waters of which imbibe a saline impregnation from receiving the overflowings of the Droitwich brine springs.

Meum Fœniculum, Fennel. Spetchley.

Carum Carni, Carraway. Meadows near Worcester.

Pimpinella saxifraga, Burnet saxifrage. Dry banks on the Leigh Sinton, and other roads and elsewhere, very common.

P. magna, Great Burnet Saxifrage. On the limestone hills, near Suckley.

Bupleurum rotundifolium, Thorow-wax. Badsey, and Bretforton.

B. tenuissimum, Slender Hare's Ear. A very rare and curious plant. Found by Mr. Addison, of Malvern, on the common between Malvern and the Rhydd.

Pastinaca sativa, Wild Parsnep. Road side, near Stoughton, abundantly. Battenhall, Cracombe, &c., on red marl and lias marl.

Viburnum Lantana, Mealy Guelder rose. By the road side at Cracombe.

Parnassia palustris, Grass of Parnassus. North side of Bredon Hill. Now become very rare in the county, owing to the almost universal drainage of lands.

Linum usitatissimum, Common Flax. In Cowleigh Park, to the north of Malvern.

Drosera rotundifolia, Round-leaved Sun-dew. Bog at the base of the Worcestershire Beacon, Malvern.

Myosurus minimus, Mouse-tail. Malvern Chace.

Galanthus nivalis, Snow-drop. Occupying the virgin turf in a glen at the northern base of the Herefordshire Beacon, near Little Malvern, apparently wild, but it is to be feared a few years will terminate the existence of the plant at this locality. Other habitats might be named, but they are suspicious.

Narcissus biflorus, Pale Narcissus. In an orchard beyond the Ketch, perhaps a suspicious place; but truly wild and abundant on the banks of Sapey Brook, near a travertine rock called the Hoar Stone.

N. Pseudo Narcissus, Daffodil. In a wood at Little Malvern, and covering a whole meadow between Malvern and Cradley. Severn meadows, at Kemsey, and in a wood at the Nash, near Kemsey.

Allium oleraceum, Streaked Field Garlick. Abundant on the Ketch Bank. With double heads of Bulbs at Battenhall, near Worcester.

A. vineale, Crow Garlick.

A. ursinum, Broad-leaved Garlick. Very abundant in Ockeridge Wood, near Holt. In various other moist coppices.

Tulipa sylvestris, Wild Tulip. Very rare. In a little copse on the red marl bank at the Ketch, near Worcester, but the roots being very deep in the soil rarely flowering.

Ornithogalum umbellatum, Common Star of Bethlehem. In a meadow near Dr. Berkley's, at Cotheridge.

O. nutans, Drooping Star of Bethlehem. In a meadow near Kemsey Grove.

Narthecium ossifragum, Bog Asphodel. Near Rubry Hill, on the Lickey.

Convallaria majalis, Lily of the Valley. Abundant in Shrawley Woods. More sparingly in Bewdley Forest.

Acorus calamus, Sweet Flag. In the Avon, near Pershore, but rare.

J. uliginosus, Little Bulbous Rush. Hartlebury Common, Malvern Hills.

Luciola congesta, Many-headed Bog-wood Rush. Perry Wood. Hartlebury Common.

Rumex palustris, Yellow Marsh Dock. Side of the Chalybeate Spa, at Malvern.

Triglochin palustre, Marsh Arrow-grass. Marshy spots about the Malvern Hills.

Colchicum autumnale, Meadow Saffron. Abundant in almost every moist meadow in the county.

Œnothera biennis, Evening Primrose. Appearing occasionally on suspicious spots within sight of gardens. A single specimen on the bank of the Teme below Powick Bridge.

Chlora perfoliata, Yellow Wort. Not uncommon on dry calcareous soils. At Cracombe, Abberley, Clifton, &c.

Vaccinium Myrtillus, Bilberry. Abundant in Bewdley Forest, and on the Bilberry Hills, Bromsgrove Lickey. Also on rocks on the Malvern Hills, but sparingly there.

V. Oxycoccus, Cranberry. Bogs on Bromsgrove Lickey.

Menziesia polifolia, Irish Menziesia. On the Lickey Hill, near Bromsgrove.

Erica Tetralix, Cross-leaved Heath. This very elegant plant is found abundantly on Bromsgrove Lickey, but not on any part of the Malvern Range.

E. cinerea, Fine-leaved Heath. Bromsgrove Lickey, and various heaths in the northern parts of the county.

Daphne Mezereum, Spurge olive. Eastham and Stanford.

Polygonum Bistorta, Great Bistort. Meadow near the spa, at Malvern. Also by the rill at Southstone's Rock; in a meadow at the top of Trampley Green, near Kidderminster, and in a moist pasture at Wichenford.

P. viviparum, Alpine Bistort. On Rosebury conglomerate rock, by the Teme, below Knightsford Bridge.

P. minus, Small Creeping Persicaria. In a gravel pit at Malvern Chace.

Paris quadrifolia, Herb Paris. In deep shady groves, as Witchery Hole near Clifton on Teme, woods at Malvern, Eastham, Stanford, &c.

Adoxa Moschatellina, Tuberous Moschatell. By the paper mill at Alfrick, but scarce about Worcester.

Butomus umbellatus, Flowering Rush. River Severn below Kemsy Ford.—Dr. Streeten. Abundant by the banks of the Avon, but rare near Worcester.

Monotropa Hypopytris, Yellow Bird's Nest. At the roots of the beech trees in the plantations at Middle Hill, Broadway. Sir Thomas Phillipps, Bart.

Pyrola media, Intermediate Winter Green. Wyre Forest, near Bewdley.

P. minor, Lesser Winter Green. Shrawley Wood.

Chrysosplenium alternifolium, Alternate-leaved Golden Saxifrage. In a marsh near Leigh Church. Also by a stream in Shrawley Wood.

Saxifraga granulata, White Meadow Saxifrage. Not uncommon. In a meadow near Laughern Brook, at Bevere, near Droitwich, Habberley, &c.

S. tridactylites, Rue-leaved Saxifrage. Adorning the wall fronting the bank of the Teme, at Powick Bridge; but the river having now undermined the wall, it has fallen down, and the plant is gone with it.

Scleranthus annuus. On the rocks of the Malvern Hills.

Saponaria officinalis, Soapwort. By the side of the pool in Shrawley Wood. Also near Bewdley and Bromsgrove Lickey.

Dianthus Armeria, Deptford Pink. In a meadow beyond Mudwall Mill, and about Cotheridge. Also at Shrawley, near the church, and in a meadow near Kemsey.

D. prolifer, Proliferous Pink. In a marl pit at Lindridge Hill, near Hanley Castle—Mr. Ballard, in Withering; bu Messrs. Walcot and Wingfield have since searched the spot in vain for it.

D. deltoides, Maiden Pink. Blackstone Rocks, near Bewdley, according to Mr. Scott; but a very rare plant.

Silene anglica, English Catchfly. Areley, near Stourport.

S. conica, Striated Corn Catchfly. Found once in a field at Iverley, near Stourbridge, by Mr. Scott.

S. noctiflora, Night-flowering Catchfly. In a sandy field behind Birchen Grove, Broad Heath.

Stellaria uliginosa, Bog Stichwort. In various marshy spots about Hartlebury Common, Malvern Hills, Ashmore Common, &c.

Arenaria trinervis, Plaintain-leaved Chickweed. Shady lanes about Worcester. Ankerdine Hill.

A. tenuifolia, Fine-leaved Sand-wort. Lane near the Toot Hill, behind the Virgin's Tavern, Worcester.

A. rubra, Purple Sandwort. A pretty ornament of the dry declivities of the Malvern Hills.

Cotyledon Umbilicus, Navelwort. In the fissures of the greenstone and granitic rocks at Malvern. Growing very luxuriantly in a lane leading to the Giant's Grave, at Habberley, near Kidderminster.

Sedum Telephium, Orpine. Shrawley Wood, marsh close to Laughern Brook, Worcester, and the rocks at Malvern.

S. album, White Stonecrop. A beautiful and interesting plant. On the rocks of the North Hill, Malvern.

S. reflexum, Crooked Yellow Stonecrop. On the abbeys at Great and Little Malvern.

Spergula nodosa, Knotted Spurrey. In the rill that rises in the declivity between the Worcestershire Beacon and the Sugar Loaf Hill, Malvern.

Lythrum hyssopifolium, Hyssop-leaved Grass-poly. Badsey, near Evesham, and Bretforton. Very rare.

Agrimonia Eupatoria, Agrimony. Frequent by road sides in various places. Gathered in great quantities in the time of flowering, for the purpose of making an astringent herb tea recommended by rustic medical practitioners.

Reseda Luteola, Dyer's Rocket. In waste places about Grimley, Leigh Sinton, &c. Growing luxuriantly on a wall bounding Angel Street Cemetery, Worcester.

Prunus Cerasus, Wild Cherry-tree. On Rosebury Rock, Knightwick, and Ankerdine Hill. Abbot's Wood. A solitary tree appearing on Helbury Hill, near Worcester, when the wood was cut down.

P. domestica, Wild Plum-tree. In the hedges near Battenhall, but doubtful if wild.

P. insititia, Bullace-tree. Dudley Castle Hill.

Mespilus germanica, Medlar. Exceedingly rare. In a coppice bordering Deerhurst Lane, opposite the Lower Lode, near Tewksbury, a spot almost overgrown with underwood, the lane being merely a rough horse track. The *Cynoglossum sylvaticum* grows in the same lane.

Pyrus communis, Wild Pear-tree. It is now somewhat difficult to meet with the pear-tree really wild, for the farmers graft every seedling that appears in their hedges. Perry Wood.

P. Malus, Crab-tree. Common enough in its genuine austere state.

P. torminalis, Wild Service-tree. Gradually dying away, and will probably be quite exterminated in a few years, as the trees are cut down. On the red marl cliff at the Ketch, and occupying the dizzy summit of Blackstone Rock, near Bewdley. The brown berries tied up in bunches are still brought to market, though sparingly, in the autumnal season.

P. domestica, True Service-tree. In the middle of Wyre Forest, near Bewdley, first noticed there by Alderman Pitts, in 1678. Recently visited by Mr. Lees, who reports it to be in a state of decay; and some wood-cutters having recently made a fire against its weather-beaten trunk, its destruction seems impending.

Spiræa Filipendula, Dropwort. At the west end of Perry Wood, and on the Old Hills, but rather rare. Hedges at Brookend, near Kemsey.

Rosa spinosissima Burnet Rose. Near Crookbarrow Hill, in abundance, and about Nunnery Wood, Hallow, and Cracombe.

R. villosa, Soft-leaved Round-fruited Rose. In Hindlip Wood, near Worcester, and between Bromsgrove and Hagley.

R. tomentosa, Downy-leaved Rose. At Bransford, Fernhill Heath, and between Malvern and Cowleigh Park.

R. Sherardi, Sherard's Rose.

R. rubiginosa, Sweet Briar. In a hedge between St. John's and Pitmaston. On Ankerdine Hill, and near Crookbarrow.

R. micrantha, Small-flowered Sweet Briar. On the Warren Hill, southward of Little Malvern.

R. Borreri, Borrer's Rose. Side of Perry Wood, and in woods near Malvern.

R. dumetorum, Thicket Rose. Between Worcester and Malvern.

R. arvensis, White Trailing Rose. Abundant about the Abberley Hills, and the Berrow Hill, Martley, &c.

Rubus glandulosus, Glandular Bramble. On Bromsgrove Lickey.

R. idæus, Raspberry. Bishop's Wood, near Hartlebury, Bromsgrove Lickey, and Shrawley Wood.

Potentilla argentea, Hoary Cinquefoil. On the sand-rock between Bromsgrove and Droitwich. On a similar rock near Holt, &c.

P. verna, Spring Cinquefoil. On the rocks of the Herefordshire Beacon, Malvern Hills.

Tormentilla reptans, Trailing Tormentil. Near Cowleigh Park, north of Malvern.

Geum rivale, Water Avens. Scarce in this county. At Abberley, according to Mr. Hickman, in Purton.

Comarum palustre, Purple Marsh-cinquefoil. On Hartlebury Common, and in pools about Bromsgrove Lickey.

Papaver, somniferum, White Poppy. Severn side, below Worcester Bridge.

Nymphæa alba, White Water Lily. In the Avon, under Littleton Bank, according to Mrs. George Perrott. Rare in a truly wild state in this county.

Nuphar lutea, Yellow Water Lily. Abundant in the tributaries of the Avon, and in various brooks and pools.

Tilia parvifolia, Small-leaved Lime-tree. Glens and lanes about the Old Storage Hill, and at Clifton-on-Teme.

Cistus Helianthemum, Dwarf Cistus. Abundant on the Heredfordshire Beacon, Malvern Hills, and Bredon Hill. Also on dry banks at Alfrick, Clifton-on-Teme, Crowle, &c.

C. polifolius, White Mountain Cistus. Mr. Ainsworth in a "Sketch of the Physical Geography of the Malvern Hills," inserts this very rare plant in the catalogue which he appends to his account. No other person has, however, confirmed this discovery, and some mistake is therefore to be apprehended.

Delphinium Consolida, Field Larkspur. Near Grimley.

Aconitum Napellus, Monk's-hood. On the banks of a brook running into the Teme, near Ludlow, but on the borders of this county, truly wild.

Aquilegia vulgaris, Columbine. In Bewdley Forest, Shrawley Wood, and about Leigh Sinton. The smaller variety, *A. alpina,* of Hudson, on Bromsgrove Lickey.

Clematis vitalba, Common Clematis. Abundant about Ankerdine Hill, and Malvern. Also in the hedges at Powick.

Thalictrum flavum, Meadow Rue. Eastern side of Pitchcroft, banks of the Severn, &c.

Ranunculus Lingua, Great Spearwort. Bogs on Malvern Chace, according to Mr. Ballard. The late Mr. T. B. Stretch, a Worcester botanist, records having found it in Ockerley Wood Holt. Ainsworth also inserts it in his list of Malvern plants. Whether drainage has now destroyed the plant, or whether a large variety of *R. Flammula* was mistaken for it, is uncertain, but it is not now to be met with.

R. parviflorus, Small-flowered Crowfoot. Under hedges by the road side, near the Virgin's Tavern, Worcester. Also at Hallow, Cotheridge, Alfrick, and Malvern, in considerable plenty.

Trollius europæus, Mountain Globe Flower. Moist meadows at the foot of Bredon Hill.

Helleborus viridis, Green Hellebore. Orchard near Mr. Ballard's, Robinson's End, Malvern Chace, according to Messrs. Welles and Ballard, in Withering. Not since remarked.

Nepeta cataria, Cat Mint. Lane beyond the Gas Works, Worcester, and in other similar situations.

Verbena officinalis, Vervain. Near farm houses at Barnard's Green, Powick, &c.

Mentha sylvestris, Horse Mint. By the side of a rill beyond the yew tree on the Ombersley road, Worcester.

M. piperita, Pepper Mint. By the side of a rill at Malvern Link, and in other wet spots about the Malvern Range.

M. rubra, Tall Red Mint. By a pool near the firs, at Clifton on Teme.

Lamium maculatum, Spotted Dead-nettle. Found near Defford Common, by Dr. Streeten.

Galeobdolon luteum, Yellow Weasel snout. In Berwick's Shrubberies, and various shady woods at Powick, Kemsey, Alfrick, Clifton, &c.

Marrubium vulgare, White Horehound. Formerly very common, but being in great request among cottagers as a remedy for cough and asthma, it has been so rooted up or transplanted into rural gardens, that it has become quite scarce. At Astley, and Clifton on Teme.

Origanum vulgare, Marjoram. Side of the road at the foot of Cracombe Hill, near Evesham. Also on the top of Southstone's Rock, and at Lower Sapey.

Thymus Calamintha, Calamint. About Malvern, Grimley, &c., by road sides.

Scutellaria galericulata, Skull-cap. In marshy spots by the side of the Severn, and Kemsey Brook.

S. minor, Lesser Skull-cap. Hanley Common, beyond Stanford.

Melampyrum cristatum, Crested Cow-wheat. Very rare. Near Ombersley.

(*To be continued.*)

OF THE BOTANY OF THE LANDSEND.

BY T. M. C——, ESQ.

The great mildness of the winter season in this district, is evinced by the growth, in the open air, of several plants which are either not natives, not cultivated, or are inmates of the green-house in most other parts of England. Among the rarer indigenous plants of this district, I may particularise the *Sibthorpia Europæa* as strikingly evincing the superiority of the winter temperature. This elegant little plant, when transplanted into the middle counties, is killed down in the winter, even in a sheltered garden. Among the tender exotics which are common in the shrubberies, the botanist will find several growing here without shelter, which are green-house plants in most other parts of England. Among the most conspicuous of the exotics is the Myrtle, which, even in its extreme shoots, is rarely injured by the cold of winter. All its common varieties, broad and narrow-leaved, single and double, thrive equally well and flower plentifully. In the open garden these plants attain the height of from 12 to 20 feet. Geraniums are also common in the borders, but many of these, in the severer winters, are killed down to the ground. The Hydrangea seems as hardy as a native, and attains an immense size, as does also the Verbena Triphylla.

The following list of some of the tenderer exotics growing in the open air, in the neighbourhood of Penzance, in the year 1820, sufficiently indicates the mildness of the winters. Many others equally delicate, or more so, would, I doubt not, thrive very well there.

Amaryllis Vittata
Arum Colocasia
Azalea Indica
Buddlœa Globosa
Bocconia Cordata
Coronilla Glauca, &c.
Calla Ethiopica
Cistus Salvifolius
Chrysanthemum Indicum
Camellia Japonica
Cyclamen Persicum
Canna Indica

Cheiranthus Tristis
Dahlia (many varieties)
Daphne Indica
Dracocephalum Canariense
Eucomis Striata
Fuchsia Coccinea
Geranium (several species of the African G.)
Hypericum Coris
——— Crispum
Hypericum Balearicum
Hydrangea Docolor
Haustonia Coccinea
Hemerocallis Alba
Lavendula Viridis
Lobelia Fulgens
Myrtus Communis
Mesembryanthemum Deltoideum
Melianthus Major
Mimulus Glutinosus
Magnolia Tripetala
Metrosideros Lanceolata
Olea Fragrans
Pittosporum Undulatum
Phylica Ericoides
Protæa Argentea
Pemica Nana
Solanum Pseudo-capsicum
Teucrium Frutescens
——— Marum
Verbena Tryphylla
Westringia Rosmarinacea.

The progress of vegetation is so little checked during the winter months, that the meadows always retain their verdure, and, in milder seasons, afford even a considerable supply of grass to cattle.

It is customary for the gardeners and small farmers, in the vicinity of Penzance, to raise two crops of potatoes in one year. The first crop is planted in November, and is gathered in April, May, and June; the second crop is planted immediately on taking up the first, and as late as to the middle of July, and is gathered in time to allow the preparation of the ground for the succeeding crop. The first or spring crop has, in general, no defence from the cold of winter, but the stable dung used for manure; and it is a very rare thing for the potatoes to be injured by the frost. Some gentlemen in the vicinity of Penzance have constantly new potatoes at Christmas, and through the whole of January and part of February, raised in the open garden with no other shelter than some matting during the coldest nights.

In consequence of the two circumstances just mentioned, the rent of land in the immediate vicinity of Penzance, is remarkably high, being very commonly from 6*l.* to 10*l.* and, occasionally, as much as 12*l.* per acre*.

Cabbages and turnips for the table, are earlier in this district than elsewhere; the former being ready in the middle of February, and the latter in the end of March. Cabbages, indeed, as they are unaffected by the winter cold, may be so regulated as to be cut in any month in the year. The cabbage in general use (the early Cornish), is often killed by the severity of the winter in the midland counties. Brocoli is often ripe against Christmas; radishes against the first of April.

Owing to the comparative coldness of the late spring months and early summer months, vegetation is considerably less rapid, after it commences, than in other parts of the island. The trees in the vicinity of London, for example, are in full foliage long before they are so in this district, even in the most sheltered vallies. The same remark is applicable to many of the garden shrubs and flowers.

The very low temperature of the summers, and the want of sufficient sunshine, prevent many of the common fruits from attaining that richness of flavour, and security of full maturation, which they possess in the inland counties. The vine very rarely ripens its fruit in the open air; and the wall-fruits, in general, are inferior, in point of flavour, to those of other counties, particularly the peach.

The apricot rarely produces any fruit, except in a few places, and then very scantily. The greengage plum is nearly equally unproductive. The walnut and common hazel-nut very seldom bear any fruit, although the latter is sufficiently productive more to the eastward in the county.

A further consequence of the cool summers is the comparative lateness of the harvests in this district. This is, indeed, not very considerable, still it is sufficiently obvious. From an account now before me, of the date at which harvest commenced, on a farm in the immediate vicinity of Penzance, for a period of seventeen years, it appears that the average period of commencement is the 12th of August; the earliest is the 3rd, and the latest the 27th.

Cornwall, like Scotland, is proverbial for its want of trees; and it is more excusable than Scotland, for there they will grow if planted; here, in many cases, they will not. All the high grounds and exposed uplands, may be said to be nearly destitute of trees. In close and sheltered vallies they grow very well. Almost all sorts of shrubs grow very well every where, and also trees until they attain a certain height. Such as grow to a height beyond that of shrubs, in exposed situations, are all stunted, and this is the case with the common thorn used for fences. All trees have their branches directed towards the east, from the predominance of westerly winds. The only tree that seems to disregard the injurious effects of the climate, is the Pinaster Fir. The Scotch Fir suffers as much as other trees.

I shall conclude this brief notice by giving a list of some of the rarer indigenous plants, with the names of the places where they are found.

Pinguicula Lusitanica—Wet patches in different parts.
Utricularia vulgaris—Between Rosemorran and Kenegie.
Salvia Verbenaca—St. Ives.
Iris fœtidissima—Madron, &c.
Scirpus fluitans—In the marsh; Gulval.
Panicum dactylon—Beach between Penzance and Marazion.
Briza Minor—Corn-fields between Gulval and Ludgvan, plentifully.
Rubria peregrina—Hayle, Helston, &c.
Exacum filiforme—Between Penzance and Marazion.
Anchusa officinalis—St. Ives.
Convolvulus soldanella—Whitesand Bay, &c.
Campanula hederacea—Trevayler Bottom, Gear Stamps, &c.
Verbascum nigrum—Gulval.
Chironia littoralis—Beach between Penzance and Marazion.
Samolus valerandi—Landsend, &c.
Illecebrum verticillatum—Gear Stamps, Landsend, Gulval, &c.
Herniaria hirsuta—Between Mullyan and the Lizard.
Cuscuta epithymum—Downs, Whitesand Bay, Lizard, &c.
Eryngium maritimum—Sea Shore, common.
Daucus maritimus—Landsend, Logan Stone, Botallack Mine.
Tamarix gallica—St. Michael's Mount, Lizard, Scilly Islands.
Drosera longifolia—Marsh between Penzance and Marazion.
Ornithogalum umbellatum—Near Marazion.
Scilla verna—St. Ives, plentiful; near Zennor, Morvah.
Rumex sanguineus—Gulval.
Alisma Damasonium—Between Penzance and Marazion.
Erica vagans—Near the Lizard, Soap Rock, Kinance Cove.
Saponaria officinalis—St. Levan.
Silene anglica—Very common in corn fields.
Arenaria verna—Kinance Cove.
Sedum telephium—Logan Stone.
——— *anglicum.*
Spergula nodosa—Near Marazion.
Euphorbia portlandica—Brehar Island, Scilly.
——— *paralia*—Scilly Islands.
Spiræa filipendula—Kinance Cove.
Glaucium Luteum—Scilly Islands.
Aquilegia vulgaris—St. Ives, Lelant, &c.
Helleborus viridus—Between Rosemorran and Kenegie.
Mentha Rotundifolia—Between Penzance and Newlyn, &c.
Sachys arvensis—Corn Fields, very common.
Scutellaria minor—Bogs Gulval.
Bartsia viscosa—Bogs, common; Corn Fields, near Hayle.
Antirrhinum orontium—Gulval, Landsend.
Scrophularia scorodonia—St. Ives, Gulval, and Chyandour.
Sibthorpia europæa—Moist banks, common in this neighbourhood; Gulval, Maddern Well, Trereife Road Avenue.

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* The Cornish Acre is one-sixth more than the Statute Acre.

Cochlearia officinalis—Cliffs near the Sea, common.
———— *anglica*—Gulval, Penzance.
Bunias cakile—Beach between Penzance and Newlyn.
Brassica oleracea—Cliffs, Penzance (perhaps introduced).
Erodium maritimum—Sea Shore, common.
——— *cicutarium*—Sea Shore, common.
Geranium sanguineum—Kinance Cove.
———— *columbinum*—Ludgvan.
Genista pilosa—Kinance Cove.
Anthyllis vulneraria—Downs, Whitesand Bay.
Ornithopus perpusillus—Gulval Carne, &c.
Trifolium subterraneum—Near the Sea Shore.
———— *scabrum*—Near the Sea Shore.
Hypericum androsæmum—Gulval, Trevayler Bottom, &c.
Solidago virgaurea—Penzance, &c.
Inula helenium—Gulval, the Mount, St. Ives.
Pyrethrum maritimum—Sea Shore.
Anthemis nobilis—Common in this neighbourhood.
Orchis pyramidalis—Near Hayle.
Neottia spiralis—Between Penzance and Marazion.
Ruscus aculeatus—Lemorna Cove.
Myrica gale—Marsh, Gulval and Ludgvan.
Osmunda regalis—Common in moist places.
Aspidium oriopteris—Gear Stamps and New Mill.
———— *ditatatum variety*—Moist Banks in this neighbourhood.
Asplenium marinum—Cliffs near the Sea, St. Michael's Mount, Lemorna Cove, &c.
———— *lanceolatum*—Gulval, St. Michael's Mount, Lemorna Cove, &c.
Hymenophyllum Tunbridgense—Among the loose stones at Castle an Dennis, on the east side.
Dicranum cirviculatum—Gulval.
———— *crispum*—St. Mary's Scilly.
Trichostomum polyphyllum—Gulval about Kenegie, Landsend, &c.
Neckera heteromalla—Trevayler Bottom, Try, &c.
Hypuum scorpioides—Gulval, Zennor, Landsend.
——— *alopecurum variety*—Gulval.
Hookeria lucens—Trevayler Bottom. Between Rosemorran and Kenegie, &c.
Mentha odorata—Buryan.
Antirrhinum repens—Near Penryn.
Polygonum aviculare—Castle Treryn.
Asparagus officinalis—Lizard.
Gnaphalium luteo-album.
Cynosurus echinatus—Ludgvan.
Euphorbia peplis—Between Penzance and Marazion.
Santolina maritima.
Saxefraga stellaris—Logan Rock.
Linum angustifolium—St. Ives.

ON THE STRUCTURE OF PLANTS.

PLANTS, whether regarded as individuals, or as grouped in the garden, the field, and the landscape, are objects of universal interest. The beauty of their forms; the delicacy, harmony, and splendour of their colours; the fragrance which they exhale; the refreshing verdure, and the convenient shade which we owe to them, besides their more important uses in contributing largely to our raiment, our sustenance, and our lodging; these connect our interests, and even our existence, with theirs: whilst the examination of their conformation, and the observation of their functions, as organized living beings, expand and elevate the mind, and raise its contemplations in wonder and in gratitude to the great Source of all life.

All plants, however different in form and other qualities, are composed of solid and fluid parts. The solid parts are generally permanent; that is to say, the organs which they constitute, when once perfected, are not subject to that waste and repair which the animal solid is supposed to undergo during life; but the fluid parts are changeable, varying continually both in mechanical admixture and in chemical composition.

The primitive solid components of the vegetable textures are *membrane* and *fibre;* from which are formed the common organic structures, the cellular and the vascular tissues, and the varied combinations of these in the bark, *parenchyma* (or spongy, porous parts), wood, pith, and medullary (or marrow) rays. The fluid elements are watery solutions of the soluble materials of the soil; from the decomposition of which, and the recombination of their ultimate components, by means of mechanical and chemical agency influenced by the principle of life, all the solid components, textures, and secretions are formed.

Vegetable Membrane is an exquisitely thin, transparent, colourless film, which resists the action of water and watery solutions in the living plant: but, when life ceases, is quickly acted upon by water, and reduced to mucilage. Du Hamel, a French philosopher of just celebrity, has asserted that vegetable membrane is composed of small organic fibres, arranged parallel to one another, and united by a glutinous substance: but no such structure can be detected by the microscope; on the contrary, it resembles a simple pellicle, or the film of a soap bubble, varying in transparency in different parts of the plant. In its simplest state it forms the sides of the cells of the cellular tissues; a little more condensed, those of the sap vessels; and still more condensed, the general covering, epidermis, or outer skin. It has also been supposed to derive its origin from minute globular bodies, found in the elaborated sap, which are dilated into vesicles to constitute the cellular tissue. There are other globules of a smaller size and more regular form, found in the interstices, which frequently exist between the cells; and which, besides being the rudiments of future cells, according to M. Keiser, a distinguished German naturalist, are the cause of the different colours of the elaborated sap. It would be absurd to attempt a serious refutation of these hypotheses: we have only to recollect that plants are living bodies; that these globules are most probably merely nourishing matter, being found in great abundance in seeds, and wherever much nutriment is wanted; and that it is as easy to explain the most complex operations of structure, as to assign a satisfactory cause for the simple dilation of these particles into organic vesicles.

Vegetable Fibre is not so easily demonstrated as membrane, and is evident in one of the vegetable organs only, the spiral vessel, which is composed of one or more threads, twisted in a spiral manner so as to form a cylindrical tube. It is probable that these filaments owe their origin to the union of minute fibres, which can be detected in the elaborated sap and in all the proper juices of plants: this opinion, however, is also hypothetical; and it is not impossible that all the vegetable textures are modifications of membrane.

To enable us to examine the intimate structure of plants with advantage, the aid of a powerful single microscope is requisite; and the objects to be examined should be placed in a drop of clear distilled water. If we wish to examine the component parts of the plant, the portion containing them should be plunged in nitric acid, and the phial placed in boiling water, which must be kept at the boiling point for twelve or fifteen minutes. By this treatment, the parts composing the vegetable tissue lose their cohesion and become transparent, which greatly facilitates the investigation of them: the boiling, however, must not be carried so far as to disorganize the tissue; but, whenever the transparency is produced, and the parts separate of themselves, the boiling should be stopped, and the parts disjoined by pincers, under distilled or filtered rain water.

RURAL ECONOMY OF SWITZERLAND.

We intend in this article to confine ourselves to the rural and domestic economy of Switzerland, the state of vegetation at different altitudes, and a few remarks on some other points of physical geography; for which purpose we shall extract, as we go forward, from an excellent work published in the German language a few years ago, by Mons. Kasthofer.

The following statements may, he assures us, give a clear and just idea of the condition of a very large portion of the mountaineers of Switzerland. As the food of the cattle is sought for six months in the year in the mountains, the proprietor or his servants must thus consume a large portion of their time. But, in the winter, there is comparatively little necessity or opportunity for work. The consequences of such a constant and regular alternation must be injurious, both to the condition and the character of the people. In summer there is unremitted activity, with little beneficial result: in winter, the sedentary habits necessary for manufacturing employment, are repugnant to those habits acquired during the summer; idleness, therefore, and mischievous and hurtful employments occupy their winter hours. The peasants of the Oberland are, besides, suffering under the pressure of heavy mortgages on their lands, due either to the community of Berne, or to individuals there; and as their debts were contracted when money was of comparatively less value, or, what is the same thing, when their produce sold at a higher rate, the pressure of these burdens is most severely felt*: other causes tend to the same result—poverty and distress. Among these may be enumerated, the minute division of the land by the operation of the law of inheritance—the system of common lands, and the increasing population. The law of inheritance has, indeed, been long in operation; but, while the people were in better circumstances, it seldom produced a minute division of land—one of the sons renting or purchasing his brother's share. Thus, on the death of the father of Klizogg, the rustic Socrates, M. Herzell informs us, that his eldest brother took his portion in land, and his other brothers sold their share to Klizogg*. An increasing population with diminished resources or industry, tends necessarily and uniformly to diminish still more those resources and that industry.

"When the great mass of a people," observes our author, "pursue a species of industry, which they either cannot, or know not how to render more productive, which, however, occupies every day, but not so as to fill up all their time, and which does not permit them to engage in such additional work as would enable them to obtain, besides bare subsistence, comforts and a small capital; and when this portion of the people, which merely vegetate, increase, while the class immediately above them diminishes, it is evident that such a state of things must have an evil influence on the character, as well as the condition of the community at large."

In proof that the evil is spreading in the mountainous districts of Berne, he cites many facts, all of which show an increase in the poorer classes, and a concomitant diminution in the richer. He asserts that it would be difficult to find in all Oberland twelve peasants who possessed twenty arpents of land in cultivation, or such an extent of meadow as would winter twenty cows. The increase of the population, the consequent subdivision of the land into smaller and smaller portions, point out the resulting poverty in no respect more clearly and strongly than in the diminution of the number of *paysans à vache*, and in the proportional increase of goats. He who is not able to keep cows, prefers goats to sheep; they yield more milk, and being kept in sheds during the night, they afford a considerable quantity of manure: whereas the sheep, remaining night and day during summer on the mountains, do not produce the same advantage.

M. Kasthofer's remarks on the measures adopted by the government of Berne, respecting the poor, are worthy of notice.

In 1643, 1676, and 1690, they established regulations evidently borrowed from the poor-laws of Queen Elizabeth. The regulation of 1690, which was made after the plague had ravaged the district, complains of the numerous hordes of beggars that oppressed the country. This fact, our author seems to think, deserves particular notice. At this period, he remarks, the common lands were not distributed; few goats were kept; potatoes were not known; commerce was free; the land was not, as at present, subdivided into minute portions; and the small-pox was constantly repressing the population, scanty as it then was. Can then, he asks, the regulations, formed under these circumstances, be effectual at present, when nearly all the common lands are distributed; the number of goats is very great; the culture of potatoes can hardly be extended; commerce is paralysed, and vaccination has put a stop to the ravages of the small-pox? And yet one of the regulations of 1690 enacted, that those who married, and were reduced to a state of poverty, should have no claim to parish relief. The necessity of such an enactment, at present, he seems to admit; but he justly doubts whether it, or any other mode to check marriages, could be carried into effect. It appears, however, that, in many of the communities, a bounty is actually given on marriage; for, as soon as a young man marries, he obtains a portion of the common land, as well as other privileges, which he could not possess as long as he was a bachelor. The encouragement thus given to marriage, was indeed in some measure counteracted by a regulation common to all Switzerland, which made it necessary for every peasant to provide himself with the arms and uniform of a militia-man, before he could obtain permission to marry. This would at once limit the number of marriages, and promote industry and economy; but the law has been repealed, or fallen into neglect, since the political revolutions in that country. A law somewhat similar prevailed in the seventeenth century in several places betwixt Hanau and Francfort; no young farmer being there permitted to marry till he had planted a certain number of walnut trees. A little reflection, however, will convince us that no regulations, the object of which is to check marriages, can be extensively or permanently effectual. There are always modes and opportunities of evading them; and even if in no case they could be evaded—if no marriage could take place, but under the strict regulations of the law, the unavoidable consequence would be, that the passions of human nature would get the better of morality, and that all the evils which illegitimacy produces to the parents and the offspring, and to the community at large, would be added to the evil of an excessive population. Nor would the mischief be less, if a law were passed interdicting all relief to those who married and fell into distress after such a law. Granting that public relief were refused in strict and stern compliance with this law, even in cases of the most urgent distress, occasioned by no want of industry or economy, the feelings of individuals would supply what was refused from the public funds; and it is well known, that though the public funds for the relief of the poor are not administered with much judgment or driscrimination, yet private benevolence, in most instances, displays much less.

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* M. Kasthofer, being an employé of the Bernese, touches rather lightly on this evil: but we may add here, that the distress in the Oberland of the Canton of Berne is increasing to a frightful extent; for the peasantry, once wealthy and independent, have become tenants of the aristocracy at Berne. We feel it our duty to state, that the aristocracy of Berne, in order to break the proud spirits of the people of the Oberland, has for years been inducing this state of things. The Oberland has been long disaffected to the patricians of Berne; many of their old rights had been nullified, and, as late as 1814, an insurrection broke out against the government of Berne, which was only crushed by the most violent measures. Hence the aristocracy thought, that, in possessing itself of the greatest part of the landed property, they would render the inhabitants of the Oberland dependent on themselves; and it became, therefore, a concerted plan to buy up every freehold property in the district. Under the pretence of assisting the Oberlanders in difficulties, loans were made to them, and when payment was not forthcoming at the appointed day, their property was wrested from them with heartless cruelty. Advantage also was taken of the famine, in 1817, and of the subsequent general stagnation to trade; and, at length, the system having been pursued with unrelenting obstinacy, the wealthy part of the inhabitants of the Oberland found themselves surrounded by mere tenants of the patricians of Berne, indeed, by a class of *serfs* to all intents and purposes. Then they perceived that it was useless to stem the torrent of patrician influence, and most of them withdrew even from the election of country members for the council of Berne.

But it was more easy to dispossess the people of the Oberland of their landed property than to foretel the exact measure of their poverty and beggary. With the loss of property their hearts were broken, and the stimulus of activity was gone. A number of respectable small proprietors had either been changed into poor tenants, or into lazy vagabonds. A high rent soon brought the former to a level with the latter. Workhouses and poor laws made the thing worse; and we are sorry to say that it will, in the present state of things, be difficult to devise any efficient remedy.

As we before mentioned the council of Berne, we beg leave to say, that this sovereign council consists of two hundred and ninety-nine members, two hundred being patricians, and ninety-nine country members. It is evident that an opposition of ninety-nine against two hundred would be unavailable, even if the ninety-nine were all unanimous. But the fact is, that the patricians get themselves again elected in the country, and we have just shown, that it cannot be difficult for them to carry their election in the Oberland. More than half of those who should be representatives of the country, are, in this way, also patricians. These patricians elect themselves for life. The nearest relatives may sit in the council. Therefore the concession of ninety-nine country members by the aristocracy to the people is a mere mockery.

For more than a year the aristocracy of Berne kept Switzerland in the dread of civil war; it made efforts at the Congress of Vienna to recover the Pays de Vaud, and Argovia, and to deprive those cantons of the independence which they had acquired by solemn treaties. But public opinion was so decidedly against the aristocracy of Berne, that the allied powers would not comply with their request.

* In the canton of Schwytz, the land is not exposed to this minute subdivision, as there the management of it is, by law, given exclusively to the youngest son. In the Emmenthal, a valley celebrated for its beauty and cultivation, the land descends to the youngest son, who pays his brothers and sisters their portion by mortgaging it.

The check to excessive population in Switzerland, and all other countries, must be sought in the people themselves. Extend and improve agriculture, manufactures, and commerce, and thus create a greater demand for labour: but this is only attacking the evil on one side. If the price of a commodity is too low, it will be raised to its proper level most speedily and effectually, if we can, at the same time, augment the demand for it, and diminish its supply. So with human labour: increase the demand for it certainly, by opening new sources of industry; render industry and capital more productive by improvements in agriculture, &c.; but, at the same time, diminish the supply of labour in the market. And this, as we have observed, can be done only by the labourers themselves checking their own increase. This, however, they will not be disposed or enabled to do, till they are imbued with sounder principles, with greater comprehension of mind, and with less grovelling and narrow views. Then, regarding as indispensable for themselves and their offspring, what they now consider as unnecessary and unsuited to their station, and having their views and their desires so steadily fixed on their well being, as to look beyond their own immediate gratification, they will deem it equally their duty and their best interest not to marry, till they can see a much greater probability of securing for themselves and offspring the higher and more extended objects of their desire, than they do, at present, of obtaining the mere necessaries of life. Then, indeed, the supply of labourers will diminish, and wages will rise, so as to place the mass of the population much higher in the scale of comfort than they are. But the disposition to act in this manner, to be themselves the curers of the misery by which they are depressed, can only be generated, and founded on such a basis of principle, feeling, and habit, as will secure them against every trial or temptation, by the culture of their mind, so as to weaken the influence of the present moment, and to enable them to regulate their conduct, and form their sense of duty, by views of future and permanent interest alone.

We have dwelt thus long and strongly on this subject, because our author, in his zeal for the improvement of agriculture and the introduction of manufactures, seems to think that these measures of themselves will thoroughly and permanently remove the evils under which his country labours, in common with most other countries in Europe.

Emigration cannot be an effectual remedy for the misery of an excessive population; the source must be cut off in the manner we have indicated, otherwise as fast as the overflowing and injurious population is drawn off, its place will be supplied and the evil continued. But, independent of this consideration, emigration to foreign countries ought not to be encouraged, so long as the native country contains uncultivated land. In Switzerland, the people seem to emigrate from districts where they might find employment; this is particularly the case in the Crisons, and they do not emigrate to other districts where, according to our author, labour is scarce, and wages high—but to America. We can hardly suppose, however, that the Swiss, who are proverbially attached to their native land, even to nostalgia, would quit it, unless there were some regulations which opposed the exercise of their industry at home in a profitable and agreeable manner.*

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* One such regulation our author mentions and reprobates. In the high districts of Berne, the farmers are not allowed to sell their hay beyond their parish till they have offered it to those within it; and, nearly over all the alpine districts, no stranger can rent or purchase land. This restriction necessarily tends to prevent improvement, as well as a competition for labourers.

The agriculture of Switzerland, and more especially of those parts which our author visited, is necessarily of a peculiar nature, and on a very confined scale: it is a country strictly pastoral: little corn is produced, and the crops are scanty and precarious. Cattle, sheep, and goats constitute the chief riches and dependence of the inhabitants. There are, properly speaking, no farmers; each proprietor farms his own small portion of land; or the mountainous tracts belonging to the communities are pastured in common. But whether private or common property, it is evident that mountainous pastures are little susceptible of improvement. They may be stocked fully with the best kind of cattle; and where they admit of it, they may be planted with those kinds of trees, the leaves and small branches of which will supply the largest quantity of nourishing fodder. Indeed, the procuring a sufficient quantity of fodder, for the winter support of the cattle, is the great difficulty in these parts of Switzerland; without this, they can have little manure for the improvement of their valley lands, and the condition of their cattle must be deteriorated. Every blade of grass, therefore, is collected with the greatest care.

"In places inaccessible to cattle," Mr. Malthus informs us, "the peasant sometimes makes hay with crampons on his feet. Grass is cut not three inches high, in some places three times a year; and in the valleys, the fields are seen shaven as close as a bowling-green, and all the inequalities clipt as with a pair of scissors. In Switzerland, as in Norway for the same reasons, the art of mowing seems to be carried to its highest state of perfection." We may add, that in no country are so much

We have already mentioned that sheep are not a favourite stock in many parts of Switzerland; the difficulty of procuring food for them in winter is one cause. M. Kasthofer, however, mentions a fact which, if uniformly the case, would, in a great measure, do away with this ground of objection to sheep. He was assured that sheep, suffered to remain on the mountains during winter, procure food for themselves sufficient not merely to support life, but to keep or render them fat; and he adds that, in Norway, when winter fodder fails, the sheep are turned out, and by scraping away the snow forage for themselves; the same is the case in Iceland. The Burgamese seem the most industrious and skilful sheep-masters. They rent the pastures of Mount Spulgen, which keep nine hundred sheep, and one hundred and fifty horses during twelve weeks; they have regularly rented them for many generations; they pay about seven hundred francs annually. These Burgamese, as soon as they arrive with their flocks, divide them into four parcels, each of which during this sojourn is kept separate, under the care of a shepherd. One divison consists of those which are suckling; another of those meant for the butcher; the third, of the young sheep; and the fourth, of the sheep that are in milk, but without lambs. Those for the butcher are pastured on the highest ground, because the short and dry food there will put them into the best condition for slaughter; those in milk, on the other hand, feed lower down, where the more luxuriant and succulent pasture will keep them in full milk. These sheep-masters, however, pay no attention to improving the breed; a heavy carcase for the butcher, a heavy fleece for

skill and attention required in harvesting corn and hay as in Switzerland, in consequence of the uncertain nature of the climate.

Unsusceptible, however, as the agriculture of those parts of Switzerland visited by our author is of much improvement, in some respects it might be rendered more productive. The non-application, or the injudicious use of manure, the neglect of the means of increasing the quantity of manure, of winter fodder, of irrigation, and of green crops; the rude and imperfect implements, especially ploughs, used on their arable lands—these are points on which our author dwells with much emphasis and judgment. It is, however, just and proper to state, that, in some parts, very minute attention is paid to forming and collecting manure, especially that liquid manure, which, in the German cantons, is known under the name of *Jauche*, or *Mist-Wasser*, and in the Canton de Vaud, of *Lissier*.

Cows, goats, and sheep, as we have already remarked, constitute the principal means of support and wealth of the Swiss farmers; or, to discriminate more accurately, the goats, in a great measure, support the poorer class; and the cows supply the cheese from which the richer derive their little wealth. The extent of a pasture is estimated by the number of cows it maintains: six or eight goats are deemed equal to a cow; four calves to the same, four sheep, or four hogs; but a horse is reckoned as five or six cows, because he roots up the grass. Throughout the high Alps they are of opinion that sheep are destructive to the pastures, in proportion to their elevation, because the herbage, which they eat down to the roots, cannot, in such a cold climate, regain its strength and luxuriance. The mountain pastures are rented, at so much per cow's feed, from the 15th of May to the 18th of October; and the cows are hired from the peasants for the same period: at the end of it, both are restored to their owners. In other parts, the proprietors of the pastures hire the cows; or the proprietors of the cows rent the land. The proceeds of a cow are estimated at 3*l.* or 3*l.* 10*s.*;—viz. 25*s.* in summer; and during the time they are kept in the valleys or in the house, at 2*l.* The Grindelwald Alps feed three thousand cows, and as many sheep and goats. The cattle are attended on the mountains by herdsmen; when the weather is tempestuous, they are up all night, calling to them, otherwise they would take fright and run into danger. Chalets are built for the use of the herdsmen: these are log-houses of the rudest construction, without chimney, and a pit or trench for the fire, dug round by way of a seat. To these chalets, the persons whose employment it is to milk the cows, and to make cheese and butter, ascend in the summer time. When they go out to milk the cows, a portable seat with a single leg is strapped to their backs; at the hour of milking, the cows are attracted home from the most distant pastures by a handful of salt, which the shepherd takes from a leathern pouch hanging over his shoulder. During the milking the *Ranz des Vaches* is frequently sung.

The Swiss cows yield more milk than those of Lombardy, where they are in great demand; but after the third generation their milk falls off. In some parts of Switzerland, they yield, on an average, twelve English quarts a day; and, with forty cows, a cheese of forty-five pounds can be made daily. In the vicinity of Altdorf, they make, in the course of a hundred days, from the 20th of June, two cheeses daily of twenty-five pounds each, from the milk of eighteen cows. On the high pastures of Scarla, a cow, during the best season, supplies nearly sixty pounds of skim-milk cheese, and forty pounds of butter. Reckoning twenty pounds of milk, observes our author, equivalent to one of butter, the produce in milk will be eight hundred pounds for ninety days, or less than nine pounds a day. This small supply he ascribes to the great elevation of the pastures, and the bad keep of the cows in the winter.

Great variety of cheese is made in the districts of Switzerland visited by our author; the most celebrated is the Schabzieger. This is made by the mountaineers of the Canton of Glarus alone; and, according to his account, in its greatest perfection in the Valley of Kloen. The dairy is built near a stream of water; the vessels containing the milk are placed on gravel or stone in the dairy, and the water conducted into them in such a manner as to reach their brim. The milk is exposed to this temperature, about six degrees of Reaumur (forty-six Fahr.), for five or six days, and in that time the cream is completely formed. After this is skimmed off, the caseous particles are separated, by the addition of some sour milk, and not by rennet. The curd thus obtained is pressed strongly in bags, on which stones are laid; when sufficiently pressed and dried, it is ground to powder in autumn, salted, and mixed with either the pressed flowers or the bruised seeds of the *Melilotus officinalis* (melilot, a species of trefoil). The entire separation of the cream or unctuous portion of the milk is indispensable in the manufacture of Schabzieger. The unprepared curd never sells for more than three-halfpence a pound; whereas, prepared as Schabzieger, it sells for sixpence or sevenpence. Our author is, therefore, surprised that other cantons do not follow the example of Glarus; and he advises other aromatic herbs to be used, and thus a variety of such cheeses manufactured. In the Upper Engadine, cheese is made, which, in mellowness and flavour, equals the Gruyere, and which was formerly in great demand in the Italian monasteries. The cheese of Switzerland must have been for a long period a great article of commerce; for Myconius of Lucerne, in the beginning of the sixteenth century, in a commentary on a poem of his friend Glarianus, expatiates on the large quantities of butter and cheese which his fellow-citizens sent into Burgundy, Swabia, and Italy: he adds, that twenty cows would bring in annually a net sum of one hundred crowns. And in 1563, a law was passed in the Upper Engadine, to guard against fraud in the manufacture of cheese meant for sale. Formerly the depôts of rich cheese were principally near Lake Como; it was supposed that the exhalations, at once warm and moist, ripened the cheese, without drying it too much; at present, however, those depôts are not nearly so numerous. In the Higher Engadine cheese loses, by drying, a twentieth part of its weight in the ten first weeks; and skim milk cheese the half of its weight in two years. Of the quality of cheese exported from Switzerland we have no information that can be relied upon; but it is computed that thirty thousand hundred weight of Gruyere alone, fit for exportation, is annually made; and that, from the middle of July to October, three hundred horses, weekly, are employed in transporting Swiss cheese over Mount Grias.

the manufacturer of coarse cloth, and cheese and curd are all they look to*.

In many respects the forests of Switzerland are of great use and importance: they supply the principal winter food for cattle, &c.; they shelter the corn, and even the pastures, in exposed situations; and they are the best preservatives of villages, built at the foot of mountains, against avalanches. Our author's remarks and suggestions on this topic are extremely judicious. He observes, that the native trees of any district are not, of course, the most useful or profitable trees that might grow there; he would therefore ascertain which are the most useful for fodder, or profitable for their timber, and these he would substitute for the native trees. He would likewise improve the forest lands, where practicable, by cutting down the trees at certain periods, and alternating corn crops: in some places he would substitute trees for corn, or pasture, while in other places he would convert forest land into permanent arable or pasture land. One of the most useful trees in Switzerland is the Pinus Cimbra, or Stone Pine; it is, indeed, of very slow growth: one of them, cut down when nineteen inches in diameter, displayed three hundred and fifty-three concentric circles. Its usual growth is a span in height in six years. The timber of this tree has a most agreeable perfume, and is much used for domestic utensils, as well as for wainscoting rooms. When our author visited the chateau of Tarasp, he was struck in almost every apartment with the perfume of this wood: and he remarks it as a surprising and inexplicable circumstance, that the wood should have exhaled this perfume for some centuries in undiminished strength, and without the wood itself having suffered any decrease of weight. But this wood possesses another recommendation—rooms wainscoted with it are not infested with bugs or moths. Its seeds are esteemed a delicacy; they are eaten in great quantities at the winter parties; and on those occasions the female sex, our author assures us, display, in extracting them, a high degree of skill, mixed with much innocent gaiety and vivacity. He censures, however, in another place, this use of the seeds, and recommends that common in Siberia; there, according to Pallas, an oil is extracted from them which is used at table, and might be in the manufacture of soap. This species of pine is becoming very rare, and he, therefore, strongly recommends attention to its cultivation †.

For the satisfaction of our readers, we subjoin, in a note, the state and nature of the vegetation at different elevations in the districts which he visited. He seems to have bestowed great pains on this part of his work; to have ascertained, as accurately as the barometer would admit, the elevation, and to have registered carefully the cultivated plants, as well as the different kinds of forest trees that were growing at each different elevation, as well as the state of their vigour or productiveness. The details we have collected with great care from different parts of the book, and arranged them in the order of increasing elevation *.

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* They make the cheese with one measure of ewe milk added to three measures of cow milk; they use little rennet, and no acid, because, according to them, the mixture of the two kinds of milk is of itself almost sufficient. It is to this management that our author ascribes the greater delicacy of flavour possessed by the ewe milk cheese of the Bergamese over that made in the Oberland.

The celebrated cheese of Roquefort, in France, is made of a mixture of ewe and goats' milk; the cheese of Sassenage, in Dauphiny, of ewe and cow milk: it is said that a mixture of all the three, cow, ewe, and goat, makes the best cheese. Scheuchzer (author of Itinerarium per Helvetiæ Alpinæ Regiones, Leyden, 1723, much enlarged, and published in German, Naturgeschichte, &c., Zurich, 1748), describes the very various preparations of milk made and used by the mountainers of Switzerland.

† In order to expedite and secure its growth, and thus remove the principal objection to its cultivation, he advises that the seeds should be deposited in a compost of earth, and the clippings and leaves of the pineaster and the larch; or that this compost should be put round the roots of the young plants. The larch is a valuable tree, not only for the purpose of forming manure, but also for its durable timber. This lasts four times longer than pine timber grown at the same elevation. If, therefore, the larch were planted where the pine now grows, it is evident, as our author remarks, that much forest ground might be gained and applied to pasture. The foliage of these and other trees is carefully collected on the mountains for winter fodder, put into large nets, and then hurled down into the valleys. Near Seldun, the leaves of the nut and the elm are used in a particular manner: gathered when in their prime, they are dried and ground into powder; in this state they are given to swine, mixed with their customary drink, in the winter; and our author was assured that this food fattened them as well as barley meal. In the Oberland, the bark of the young oak, peeled off in the spring, dried and ground, is found to be equally healthy and nutritive for all kinds of cattle. We mention these things because a knowledge of them may be useful in the mountainous districts of our own country. With this object we mention the following application of sage (*Salvia glutinosa*) in the Oberland: they spread the stalks under the beds, or they draw a broom made of them gently and slowly along the floor; by this means *unpleasant* insects are destroyed, as they get fastened to the glutinous surface of this plant.

* *State of Cultivated and Spontaneous Vegetation, at the following altitudes above the level of the Sea, in Fr. feet.*

Embs. 2200. Buck wheat, sown after rye is reaped, ripens: at Ilanz it does not come to maturity; and a little higher, the forty days' maize (quarantino) is very precarious; at the same height in the valley of the Upper Rhine, the vegetation of this plant ceases altogether.

Castasegna. 2300. At this place, near the borders of Lombardy, is the limit of the cultivation of the white mulberry: at a greater elevation, neither this tree nor silkworms are seen.

Tavanessa, between Ilanz and Truns. 2400. The last walnut-trees are seen: it is remarked, that this fruit-tree thrives better in valleys with an east exposure than in those with a north, even though the elevation and other circumstances are the same.

Sta. Maria. 2750. The vegetation of the chestnut-tree ceases near this place.

Porta. 2810. The limit between the vegetation of the north and the south is generally fixed here: a little higher, on the side of Bergonova, a few straggling and stunted walnut-trees are seen, while at the base of the rock on which the ancient and lofty town of Porta is built, walnut and chestnut-trees flourish in luxuriant fruitfulness; and at a short distance from Porta, the fig-tree adorns and enriches the gardens, and the flanks of the mountains are covered with the cytisus and the broom.

Churwalden. 3800. Here flax, hemp, and barley, are cultivated with success: winter rye is not so certain a crop. Cherries ripen; but fruit with pips (apples, pears, &c.) is not grown. At Parpan, a village six or seven hundred feet higher than Churwalden, they do not cultivate any species of grain: different kinds of trees, such as the Italian poplar, the ash, and the wild cherry, which grow at Churwalden, will not vegetate at Parpan: the only cultivated plant at this latter place is a species of the *Rumex Alpinus*.

Vilo. 3880. Different varieties of the fir-tree compose the entire and exclusive vegetation. A little lower, larches, intermixed with some of the pinus cimbra, or stone-pine, commonly called *Alvier*, are seen: all the more common species of grain are sown, and potatoes are generally introduced. Maize, which succeeds perfectly a little lower, ripens here also in ordinary seasons. In another part, however, our author seems to fix an elevation of two thousand, or two thousand five hundred feet, as the limit of the productive cultivation of maize. He also remarks, that an elevation of three thousand feet, Such is the substance of the most important observations made by our author on vegetation, as affected by altitude. Altitude, however, alone, independent of exposure and other circumstances, is no indication of the nature or variety of

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with a southern exposure, will allow the cultivation of buck wheat (*blé sarrasin*) even after the winter rye has been reaped.

It will be curious, and may be instructive, to compare the limit, in respect to elevation, that bounds the profitable culture of maize in this part of Switzerland, with the limit, in respect to latitude, that bounds its profitable cultivation in France. According to Arthur Young, the line of separation between maize and no maize is first seen on the western side of the kingdom in going from the Angoumois, and entering Poitou at Verac, near Ruffec: in crossing Louraine, it is first met with between Nancy and Luneville: in crossing from Alsace to Auvergne, the limit is at Dijon. Hence, it appears that the limit of the maize culture is two degrees and a half farther north on the eastern than on the western side of France; the northern boundary on the west side being about forty-six degrees and a half, and on the east side about forty-nine degrees. From this fact, connected with the two other facts, that the northern limits of the vine and olive culture in France are parallel to the northern limit of the maize culture, Mr. Young inferred, that the eastern side of France is two degrees and a half of latitude hotter; or, if not hotter, more favourable to vegetation than the western.

Isola. 3900.* Potatoes are fit to be taken up and barley to be reaped here a month earlier than in the Oberland, where the elevation is only three thousand four hundred feet, but where there is a northern exposure. Flax and hemp succeed here; and in the small and sheltered inclosures the sunflower flourishes in all its splendour and magnificence: in the meadows the maple and the ash exhibit every symptom of healthy and luxuriant vegetation. Our author very justly remarks, that the ripening of the seeds of trees is a surer criterion of the comparative temperature of different situations and climates than the ripening of grain or other cultivated vegetables, since the maturity of these must often depend on fortuitous circumstances, or on the skill, labour, manure, &c. bestowed on them.

Wiesen. 4400. Near this village, on the declivity of a mountain facing the south, rye sometimes reaches maturity, provided it is sown immediately after harvest; and hemp not unfrequently succeeds.

Zernetz. 4400. The inhabitants obtain a crop of rye; but in order to succeed, it must be sown in a particular manner, viz. in the spring, along with March barley: after this is reaped, the rye is mown, and at the next harvest time of the barley it also has arrived at maturity: the rye is sometimes sown along with peas instead of barley. Potatoes were not tried till after the scarcity in 1817: they succeed well. Hemp also thrives: but flax, more delicate and susceptible of cold, is not cultivated at Zernetz.

Casaccia. 4600. On the higher grounds in this neighbourhood the pineaster, or cluster pine-tree prevails: the larch is seldom seen, though this and the stone-pine constitute the chief part of the forests of the Higher Engadine. At a lower elevation the service-tree flourishes, and lower still, near Casaccia, the alder-tree (*Betula Alnus Viridis*) covers the side of the mountain. No species of corn is cultivated. Our author observed a small extent of potatoes, which seemed planted solely as an experiment, and did not appear as if they would ripen.

Selva. 4900. The stalk as well as the seed of flax comes to perfection here; hemp also has occasionally succeeded. Between one hundred and one hundred and fifty feet higher up, that is, at an elevation of more than five thousand feet, barley ripens on the sides of the mountains exposed to the sun. Some cherry-trees grow near Selva, and the cherries occasionally ripen.

Valley of Au. 5270. In the Garden of the Inn, our author found carrots, cauliflowers, *raves*—a kind of turnip with a carrot root, long, thin, and poor—and the white cabbage; the last, however, not well-hearted. Potatoes are not grown.

Samaden. 5300. Raves succeed here, as well as turnips; potatoes do not. One hundred feet higher, on the side of Celerina, barley and oats ripen. This fact excites our author's surprise, but he does not account for it. He informs us that, in the upper district of Berne, neither oats nor barley are grown at a higher elevation than four thousand feet; and that in a Bernese valley, with only three thousand four hundred feet elevation, turnips, sown in the spring, perish from the cold; whereas the *navets d'hiver* (species of rape?) do not suffer, and yield abundance of oil.

St. Maurice. 5500. In the kitchen-gardens here, our author found the turnip-rooted cabbage, pease in flower, carrots, raves, lettuce, and cabbages, very indifferently hearted.

Scarla. 5580. Notwithstanding this great elevation, a considerable quantity of corn is grown: barley alone succeeds, and often the premature frosts of August or September destroy it.

Campfer. Between 5600 *and* 5700. Barley and potatoes sometimes succeed in this district. Our author regards this as the limit of their vegetation. Trefoil will not grow higher than at Lutz, five thousand three hundred feet; and, in 1822, there was no barley harvest higher than at Celerina.

Sertig. 5650. Near the church of this place a few raves were growing; but no potatoes nor grain. About two hundred feet lower, in a sheltered situation, is a forest of pine-trees: potatoes and barley often arrive at full maturity here. In consequence of the northerly exposure of the ground near the church, carrots will not grow, though they succeed in a more elevated situation than that at which potatoes and barley usually ripen. At the same height, and with the same exposure, melilot, a species of trefoil, flourishes. As this plant grows spontaneously in Lybia, and succeeds in the cold climate of the Alps, our author suggests the practicability of enriching the mountains of Switzerland with the indigenous plants of warm climates, and especially with those of the papilionaceous class. The melilot (*Lybian trefoil*), growing at the foot of the glaciers of Scalitta, and the apricot-tree, acclimated in the Grindenwald, justify his suggestions and hopes.

Maloya. 5730. No grain, flax, nor kitchen vegetables grow here.

Splugen. 5850. The elevation of the *hospice* on this mountain is equal to that of the hospice of the Grimsel in the Oberland; but vegetation is much more varied and luxuriant.

Tchugen. 5900. At this high elevation the only plant cultivated is the *Rumex alpinus* *. About three hundred feet lower, the stone-pine and the larch present a healthy and vigorous appearance: the seed of the former arrives at maturity in the beginning of October.

Berenboden. 6225. Though neither the soil nor exposure were favourable, larches, a foot and a half in diameter, and sixty feet high, grew here: the stone-pine and common fir also flourished: six hundred feet higher, some of these trees were growing on the top of a rock, probably at the greatest elevation at which they will grow. Neither the alpine-pine nor the aquatic alder were to be seen; but only some wild medlar-trees. None of these (with the exception of some larches) seemed degenerated; whereas, on the mountains of Berne, forest trees grow stunted, and perish gradually in proportion to the elevation at which they are found.

7400. At the highest point of the passage of Fluella, forest vegetation had ceased: abundance of the *poa alpina*, however, vegetation; on these points some incidental remarks have already been given. We add other results to which he came. He remarks generally, that, in the valleys of Switzerland, the temperature of districts at a short distance from one another, often varies extremely. The elevation of the valley of Untersee is the same as that of Gestein; yet the thermometer in 1822-23 fell only to 8 deg. below zero in Untersee; whereas at Gestein, it fell to 10⅛ deg., and at Berne, to 16 deg. The depth of the valleys influences vegetation; the deeper they are, the more intense the cold on the summits of the surrounding mountains: thus, the pine does not thrive on the Bragel, an elevation of 5100 feet, whereas, it thrives at the same elevation on the Rhetian Alps; the valleys of the Linth, the Muotta, and Kloen, being deeper than those of the latter district. In like manner, in the valley of Davos, agricultural produce succeeds in places much more elevated than in the Bernese valleys, because the latter are deeper. The warm winds from Italy have a perceptible influence on the vegetation of the contiguous parts of Switzerland; but the degree of this influence depends on circumstances. In the valley of the Inn, barley and flax are cultivated with success, at an elevation of more than 5400 feet; whereas at Laret, in the valley of Davos, though the elevation is only 4900 feet, no grain will thrive. Yet these valleys are alike in most respects, and are surrounded by mountains of the same height; they are both sheltered from the north-east wind; their soil is of the same nature; but in the valley of the Inn, the warm winds from Italy are intercepted only by a single chain of mountains, whereas two chains lie between Italy and the valley of Davos; and besides, the latter being of less extent than the former, admits of the reception of less heat from the sun. In the Oberland of Berne, an increase of height, of 2000 feet, diminishes the crop one-third. A singular fact in vegetation presents itself at the Glacier of Roccosecco, which forms one of the branches of the Berneria: on its summit there is a valley nearly horizontal, filled with ice; on this the avalanches have brought down masses of earth. This earth, thus resting on a basis of ice, produces a number of alpine plants, that supply abundant and nourishing food to the flocks of the inhabitants of Samaden. There are documents which prove that this singular pasture has been used since the year 1536.

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* This species of sorrel is cultivated in many of the mountain districts, for the purpose of fattening swine in the winter. The roots are twisted till the cellular tissue is detached; then they are put, with a small quantity of salt, into a trench, and covered with planes, over which stones are placed.

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The Manse Garden. By a Clergyman. Glasgow: Collins. 1836.

A Manual, of domestic gardening on a small scale! We might, after a little research, name scores of such books; many of them, too, by persons who possessed great practical knowledge, and who had made the art, with every kindred branch, their profound study. What, then, can be expected from a Clergyman who confines himself to a "Manse Garden?" Yet, as soon as we glanced at the volume, our surmise was, that there was in it something beyond what is every day to be met with. In the first place, the Title was neat, plain, and indicative of a simple quaintness, such as, we could figure to ourselves, became an experienced and observant minister of the Kirk. In the second place, the book was small, delivering the reader "from the killing toil of ponderosity, and from the awe of mystery," as the author himself states it. Next, we found the Address to the Reader appropriate, equally plain with the Title, and admirably expressed. And, last of all, the fine and healthful sentiment which perfumed that Address, we found richly strewed over every page of the little treatise; a treatise, of which it is difficult for us to say, whether practical instruction, cultivated taste, sound judgment, quaint cheerfulness, or originality of illustration, is most conspicuous. We hesitate not to assure our readers, that this is not only the best manual upon the subject of which it treats, which has ever come under our notice, (and we have perused many such works,) but that its style, spirit, and doctrines, are so happily wedded to one another, that we felt regret when obliged to leave off the perusal of it, before coming to the conclusion, when it first came to hand; and that, with the same zest, we recurred to it.

For the reasons now stated, we confidently predict, that the "Manse Garden" will become a household manual throughout the North. A nation of thinking people, and a nation of gardeners are to be found there. Already, in that country, how often is the eye of the traveller refreshed by the air of snugness and refinement which a few trees and shrubs afford to the dwelling-houses of the rural population! Our author has not only felicitously marked this feature, but he has also associated its existence and prevalence with higher considerations. It manifests a certain refinement in taste; and between tastes and morals, he well observes, there is an intimate connexion. In his own peculiar vein, he says, that where, about door-steps such ornaments as roses, ivy, and fruit trees exist, which hide the deformity of naked walls, "both wife and children look far prettier than they appear when seen through broken windows, mended with old hats, or met with daubled feet and awkward gait, sliding, or like to slide off, stepping-stones laid in mire. When home is rendered more attractive, the market-gill will be forsaken for charms more enduring, as they are also more endearing, and better for both soul and body. And O, what profusion of roses, and ripe fruits, dry gravel, and shining laurels, might be had for a thousandth part of the price given for drams, which cause at market places needless stay, and vain or silly bargains, together with the growing vice that ruins all."

Our Clergyman treats of Forest and Fruit Trees, of Vegetables, and of Flowers, in distinct chapters; intermingling many judicious observations, which more properly belong to landscape gardening, in so far as the extent of territory considered by him is concerned, than to horticulture. This was essential to a complete view of his subject, and affords the finest scope for his taste and skill. It is not with the purpose, however, of taking the heart out of the book, or of entering critically into the soundness of its lessons, that we have made it the subject of the present paper; but, being strongly impressed with the excellence of the whole, and regarding more extensive and important bearings than those properly embraced by gardening, as an art, it is our wish to recommend the book in the best way that we can to the community at large, and especially to those who have the smallest patch of garden ground—feeling persuaded that whoever studies or reads the work, will feel himself bettered by it.

The author claims the privilege of one old in experience, in all that he has said in his little book; and we hope, with him, that it will prove remedial, the more surely that it is small; for, what can be juster than when he says, "there is often a monstrous affectation about science, that swells a book to a consumption of far more time than would be necessary, without its aid, for the discovery of all that it contains." "If I want to know what sort of pease I should purchase for seed, I meet a list so long, that I am perplexed, like a shopping damsel amidst an ocean of calicoes; and how should I get out of the labyrinth, if indeed I venture in, to choose an apple out of three hundred varieties? My life is not long enough to try so many apples, or eat so many pease." In short, the "Manse Garden" contains every thing that is necessary for the comfort and taste of those for whom it has been produced, and cannot fail of accomplishing a world of good.

Now, by far the best recommendation that can be offered of the "Manse Garden," is to copy some of its paragraphs. We may go to any part of the work for examples. The treatise begins thus:—

"Of all the trees of the forest, the native holly is the most interesting and beautiful. Whether young, as a shrub in the garden, or old, as a lonely tree of the mountain, its glowing fruit and glossy leaves, gleaming in the winter sun, prove the delight of all eyes. It allures to its own hurt the mischievous school-boy; it is the laurel of Burns, and the sanctuary of

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was growing. A little lower down, in a southern exposure, the first pines, mixed with juniper berries, were to be seen; whereas, on the northern side, only *azaleas*, the rusty colour of whose leaves indicated the severity of the climate.

singing birds. Shielding its songsters from the hawk, it shelters them in the storm, and feeds them with its fruit when other trees are bare. It does one's heart good to see the humble blackbird pecking a red berry amidst the falling snow.

"The beauty of this tree is justly appreciated, but its use is comparatively neglected. With a little pains and patience, it were capable of altering the whole aspect of the country, and of adding largely to the comfort of every rural abode. For all the purposes of a hedge it is unrivalled; for ornamenting the lawn, or affording shelter and retirement to the pleasure-walk, it has no equal. But lawns and pleasure-grounds may not figure on the pages of so humble a title as "The Manse Garden;" yet neither must the author's spirit sink because his scope is confined. The first paradise was a garden, and though grandeur may require amplitude, beauty is contented with smaller dimensions. The most touching scenes of nature are often found, not in the wide range of hill and dale, but in the very nook of a glen; and genius may appear in a cabinet picture, as well as in one of the largest canvass. Why, then, may not the Manse Garden be fair, though the field be small? and why should not art be employed to make it a very delight to its owner, and an object of pleasure to the traveller that passes by? O for a law, originating in the perception of comfort, and self-imposed, which should make the planting of a few trees an operation as certain as the building of a house! Men would live longer and better for the happiness thus given to their homes; and the sickening sameness of bare hill-sides and of cold blue walls would be changed into a succession of the most pleasing objects. But how often do we find even the manse, or villa of similar rank, devoid of that peculiar charm which arises from partial concealment, and standing almost naked in the blast, though some shelter has been sought by a strip or clump of trees.

"When partial concealment is the object, the holly fulfils the intention of the planter; it casts a deep shade on the stone-work, and, like the dash of the pencil in a good picture, the effect remains unchanged by the changing of seasons; whereas that produced by a deciduous tree, resembles the like effect in a bad picture, whose colours fade and frustrate the design of the artist. Much more, where shelter is sought, has the holly a virtue which belongs not to any other tree. It is usual, by the common mode of planting, to have needless shelter in summer, and none in winter when the want is greatest. Why, said an ancient poet, should music be contrived only to enliven the occasions of mirth, and not rather to soothe those of sadness? And why, with like reason, it may be asked, should such trees be set for shelter as lavish their clothing on the summer months, and leave those of winter to cold and nakedness?"

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DESCRIPTION OF THE PLATES.

ASTRAGALUS MONSPESSULANUS.

MONTPELIER MILK-VETCH.
Diadelphia Decandria.
Leguminosæ.

Gen. Char.—Legume 2-celled, glabrous.

Spec. Char.—Scapes declining, the length of the leaves. Legumes subulate, round, rather bowed, smooth.

Root very large, woody, sweet, producing a vast tuft of procumbent scapes and leaves; the former nearly twice as long as the latter. Leaflets ovate, acute, pubescent, in pairs from ten to twenty. Scape simple, bearing a raceme of flowers amounting sometimes to thirty. Bracteas loose, coloured, lanceolate. Calyx smooth, green, mixed with rose-colour. Corolla an inch long, stiff. Banner very long, purple. Wings hooked, pale. Keel shorter, blunt, scarcely bending, deep purple. Legumes long, slender, 2-celled. Seeds 5 or 6, kidney-shape.

It is a hardy perennial, of ready growth; flowers early in July, and ripens seed, by which the plant is most advantageously increased: it may also be raised from cuttings of the stalks.

The best situation for the plant is an elevated one, among stones, or rock-work, where its flowering stems may hang down; thus its blossoms are displayed to greater advantage, and not so liable to be disfigured as when laying on the ground.

ALOE ACUMINATA.

MIDDLE-HEDGEHOG ALOE.
Hexandria Monogynia.
Hemerocallideæ.

Gen. Char.—Flower tubular, with a 6-cleft spreading mouth, and honey at the bottom of the tube. Filaments inserted into the receptacle. Capsule 3-celled, 3-valved, many-seeded. Seeds in two rows, with a membranous edge.

Spec. Char.—Leaves acuminate, glaucous above, flat, smooth, sparingly prickly beneath. Branches with a double bractea.

Stem none. Leaves surrounding the scape tuft-wise, assurgent, and often slightly incurved upwards; broad, subulate, plano-convex, sometimes nearly trigonal, beset with white subcartilaginous softish spines; those at the edge are teeth-like, regularly arranged, more numerous and perfect in shape; but in the other parts are often abortive, and appearing like little white pustules. Scape central, upright, from half to two feet high, beset from the base with convolute, acuminate, membranous, white bractes, resembling the upper fertile ones. Raceme spiked, longish, not very thick set. Pedicles about the length of the bractea and corolla, upright. Corolla pendulous, cylindrical, parted to the base; three outer segments narrowest and more succulent, inner ones nearly membranous, all patulously reflected at the mouth. Filaments slightly unequal, nearly the length of the corolla, sub-assurgent. Stigma simple.

A native of the Cape of Good Hope. An old inhabitant of our gardens. Requires the same treatment as the rest of the genus.

SCABIOSA ATRO-PURPUREA.

SWEET-SCABIOUS.
Tetrandria Monogynia.
Dipsaceæ.

Gen. Char.—Common calyx many-leaved, proper, double; pappus-shaped, variously split; receptacle chaffy.

Spec. Char.—Corolla radiant. Leaves cut. Receptacles of the flower subulate.

The Sweet-scabious has long and deservedly held a place as an ornamental plant in our gardens; the flowers are well adapted for nosegays, have a sweet musky smell, and are produced in great profusion from June to October.

It is a hardy biennial, requiring yearly to be raised from seeds: these should be sown about the latter end of May, or beginning of June, on a shady border of fresh earth, thinning the plants as they advance, to the distance of three or four inches; in autumn they should be removed into the border where they are intended to flower; thus treated they will become good strong plants against winter, flower early the ensuing summer, and produce abundance of perfect seeds.

The blossoms vary in colour; towards autumn the edge of the florets become paler.

ERICA PYRAMIDALIS.

PYRAMIDAL HEATH.
Octandria Monogynia.
Ericeæ.

Gen. Char.—Sepals four, persistent. Corolla 4-cleft, persistent. Filaments inserted into the receptacle. Anthers bifid. Capsule membranous, 4-8-celled.

Spec. Char.—Corolla cylindrical, dilated upwards. Flowers terminal. Bracteas remote. Anthers beardless. Sepals ovate.

We present to our readers, another Heath, a native of the Cape, introduced by Mr. Masson, in 1787, and now to be found in most of the collections of greenhouse plants in the neighbourhood of London.

It is a very ornamental species, both in regard to its mode of growth, as well as to the vast profusion of flowers with which its branches are covered; the form of these is very characteristic, and their colour, when air and sun are freely admitted to them, sufficiently brilliant.

It continues to blossom from September to March or April; in point of height, it is to be ranked among those of a middling size.

When young it is more apt to go off than many others: is raised from cuttings, in the usual way.

LYCHNIS ALPINA.

RED ALPINE CAMPION.
Decandria Pentagynia.
Caryophylleæ.

Gen. Char.—Calyx of one leaf, oblong. Petals five, with claws; their limb mostly divided. Capsule superior, opening with five teeth, of one or five cells.

Spec. Char.—Smooth. Petals cloven. Flowers corymbose. Leaves linear-lanceolate. Root perennial. Root leaves in a tuft, linear, slight.

It is chiefly to the decoration of rock-work, that this diminutive species is applicable; for this purpose it has all the desirable requisites, being hardy, of ready growth, and forming a thick tuft of foliage, from which arise numerous flowering stems, four to six inches high, sustaining heads of flowers rather large in proportion to the plant, of a lively red colour; these appear in May, continue about three weeks, and are followed by seed-vessels with us, which contain abundance of ripe seeds; by these the plant may easily be propagated; it may also be increased by parting its roots, in spring or autumn.

MOREA CRISPA.

SHORT-SPATHED MOREA.
Triandria Monogynia.
Irideæ.

Gen. Char.—Flower 6-petalled; after flowering involute above, spirally twisted beneath, finally falling off. Capsule many-seeded.

Spec. Char.—Leaves about the length of the spathe. All the segments of the flower spreading; the alternate ones smaller. Scape simple, a span high. One leaf next the root linear, the length of the scape. Flowers terminating, peduncled, few, blue.

In root and habit this species agrees with the generality of its congeners. It was found by Thunberg at the Cape of Good Hope, on hills near the town, and thrives best in a mixture of sandy loam.

It is propagated by seeds, offsets, or parting the roots, all which operations are best performed in August. Sow the seeds in small pots plunged into a bed of old tanners' bark, under a common frame. The plants also require this sort of shelter in winter, being apt to draw up weak when placed in the dry stove. If they can enjoy the free air, even in winter, when the weather is not cold, and are secured from frost and hard rain, they flower and ripen their seeds better than with more tender management. In summer they should be fully exposed to the open air till October, when they should be removed into shelter.

SOLANUM LACINIATUM.

CUT-LEAVED NIGHTSHADE.
Pentandria Monogynia.
Solaneæ.

Gen. Char.—Calyx persistent. Corolla rotate, or campanulate; 5-lobed, plaited. Anthers in some degree united, opening by a double pore at the end. Berry 2-celled, many-seeded.

Spec. Char.—Smooth, leaves pinnatifid. Segments linear-lanceolate, terminal, elongated. Racemes lateral, corymbose.

It is a plant of some beauty, but is more remarkable for having its antheræ separating widely from each other, and thereby losing the character of a *Solanum*, so far as it depends on that circumstance. The berries, when ripe, are of the size of a small plum, and of a yellowish green hue; their pulp is sweet, in some small degree resembling that of a fig;—whether it be so innocent we do not take on us to assert.

It flowers during most of the summer, and is easily increased by cuttings or seeds, and does not require more heat than the greenhouse affords; in the summer it will stand abroad, and even ripen its fruit in the open air.

GREWIA OCCIDENTALIS.

ELM-LEAVED GREWIA.
Polyandria Monogynia.
Tiliaceæ.

Gen. Char.—Calyx 5-leaved, coriaceous, coloured inside. Petals five. Scales five. Ovary usually stalked. Drupe 4-lobed, 4-celled. Nut 1-2-seeded.

Spec. Char.—Leaves roundish ovate, blunt-toothed, smooth. Peduncles solitary, 1-flowered.

Linnæus gave to this genus the name of *Grewia*, in honour of Dr. Nehemiah Grew, the celebrated author of the "Anatomy of Vegetables," &c. Of the several species enumerated by authors, few have been introduced into our collections; the one here figured, which has been long—(cultivated in the royal garden at Hampton-Court in 1692. *Ait. Kew*)—and very generally cultivated as a greenhouse plant, will grow to the height of ten or twelve feet; the stem and branches are very like those of the small-leaved elm, the bark being smooth, and of the same colour as that when young; the leaves are also very like those of the elm, and fall off in autumn; the flowers are produced singly along the young branches, from the wings of the leaves, and are of a bright purple colour.

In winter, the plants should be placed in the greenhouse, for they are too tender to live abroad in England; but they should have as much free air as possible in mild weather, as they only require to be protected from frost; and after the leaves are fallen, they will require very moderate watering, but in summer they should have it more constantly in dry weather.

This species is a native of the Cape, is propagated by cuttings or layers, and flowers most part of the summer.

GNAPHALIUM ERICOIDES.

HEATH-LEAVED GNAPHALIUM, OR EVERLASTING.
Syngenesia Polygamia Superflua.
Compositæ.

Gen. Char.—Receptacle naked. Pappus hairy or feathery. Involucrum imbricated; marginal scales round, scarious, coloured.

Spec. Char.—Leaves sessile, linear. Outer involucre rough; inner flesh-coloured.

Its branches, naturally weak and trailing, require to be carefully tied up; if this business be executed with taste and judgment, the natural beauty of the plant may be considerably heightened; for, though small, the plant possesses much beauty when cultivated, and hence is generally kept in our greenhouses.

It is readily increased by cuttings, and flowers from March to August. Was introduced to the royal garden at Kew, by Mr. Masson, in 1774.

ASPALATHUS PEDUNCULATA.

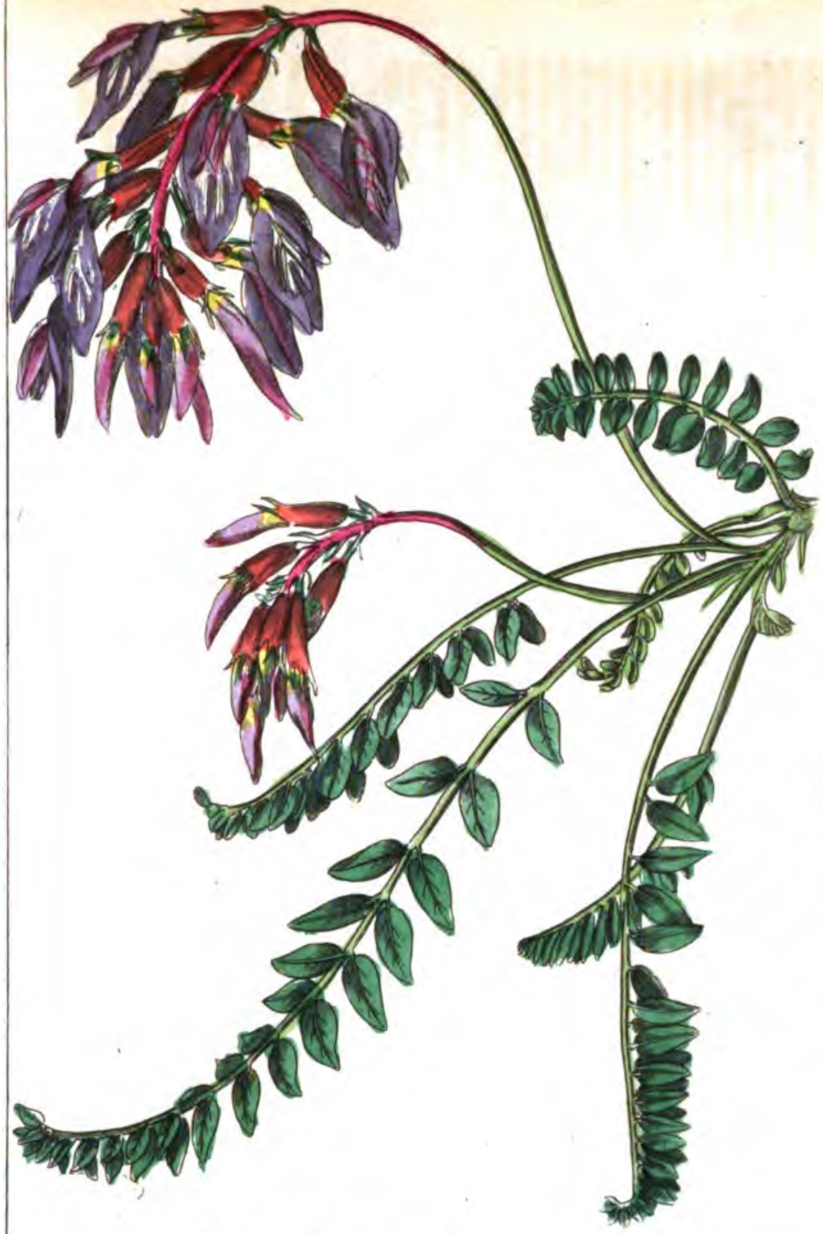
SMALL-LEAVED ASPALATHUS.
Diadelphia Decandria.
Leguminosæ.

Gen. Char.—Calyx 5-fid, upper segment largest. Legume ovate, blunt; about 2-seeded.

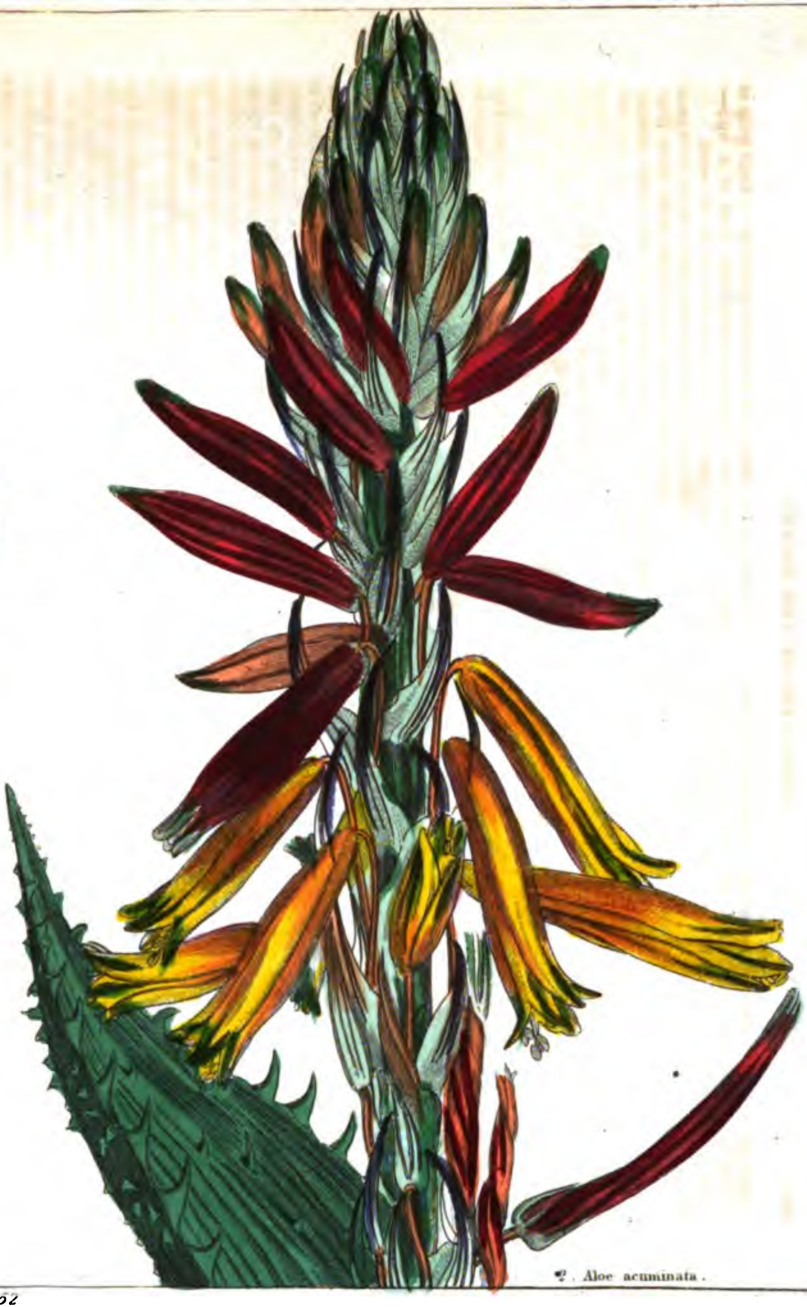
Spec. Char.—Leaves fascicled, subulate, smooth. Peduncles filiform; twice as long as leaf.

It grows to the height of several feet, produces abundance of blossoms, which open during most of the summer months, and is propagated by cuttings.

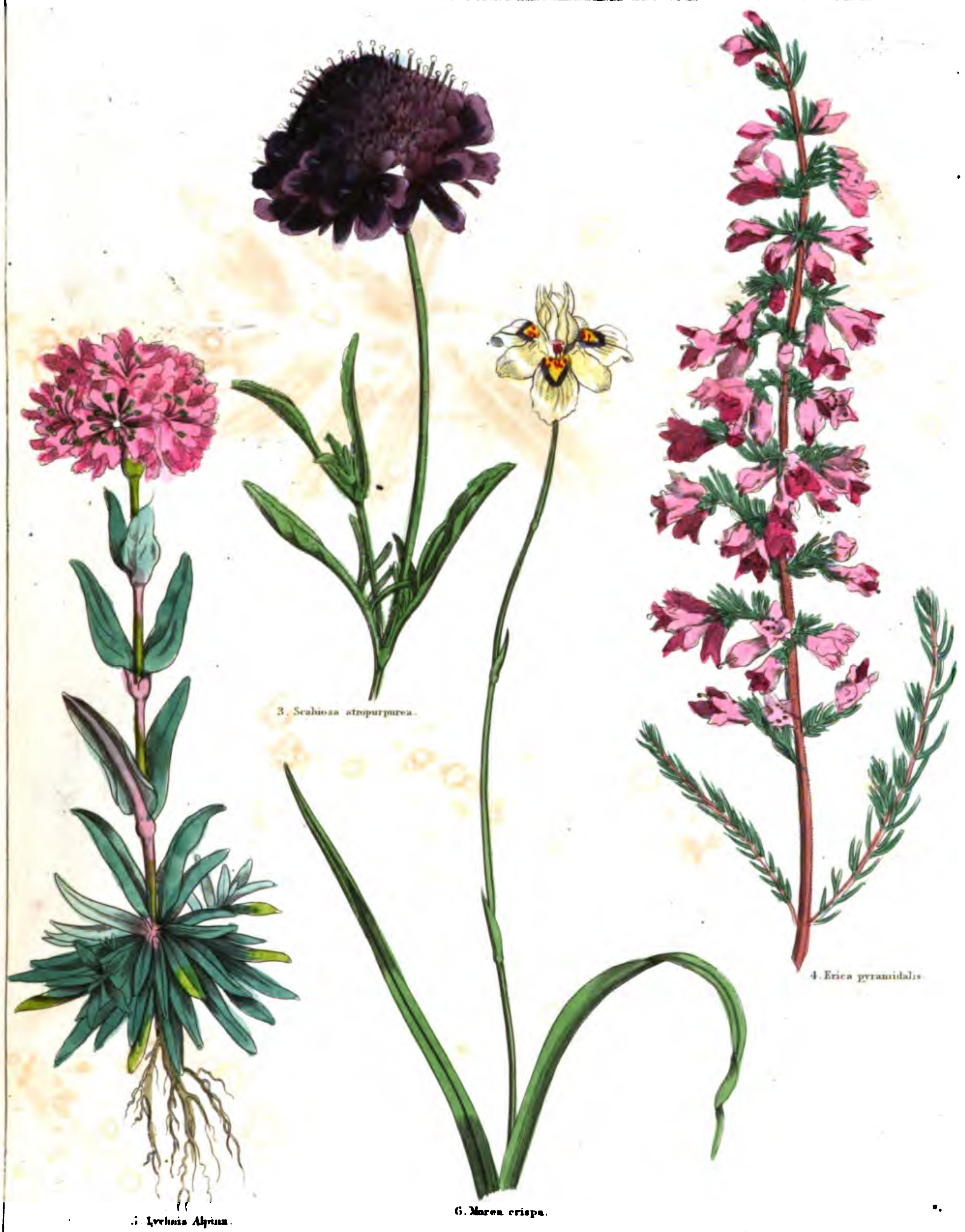
Of the five species of Aspalathus enumerated in the *Hortus Kewensis*, four are natives of the Cape; of those, three have been introduced by Mr. Masson: the *albens* and *candicans* in 1774, the present species in 1775.



1. Astragalus Monspessulanus.



2. Aloe acuminata.

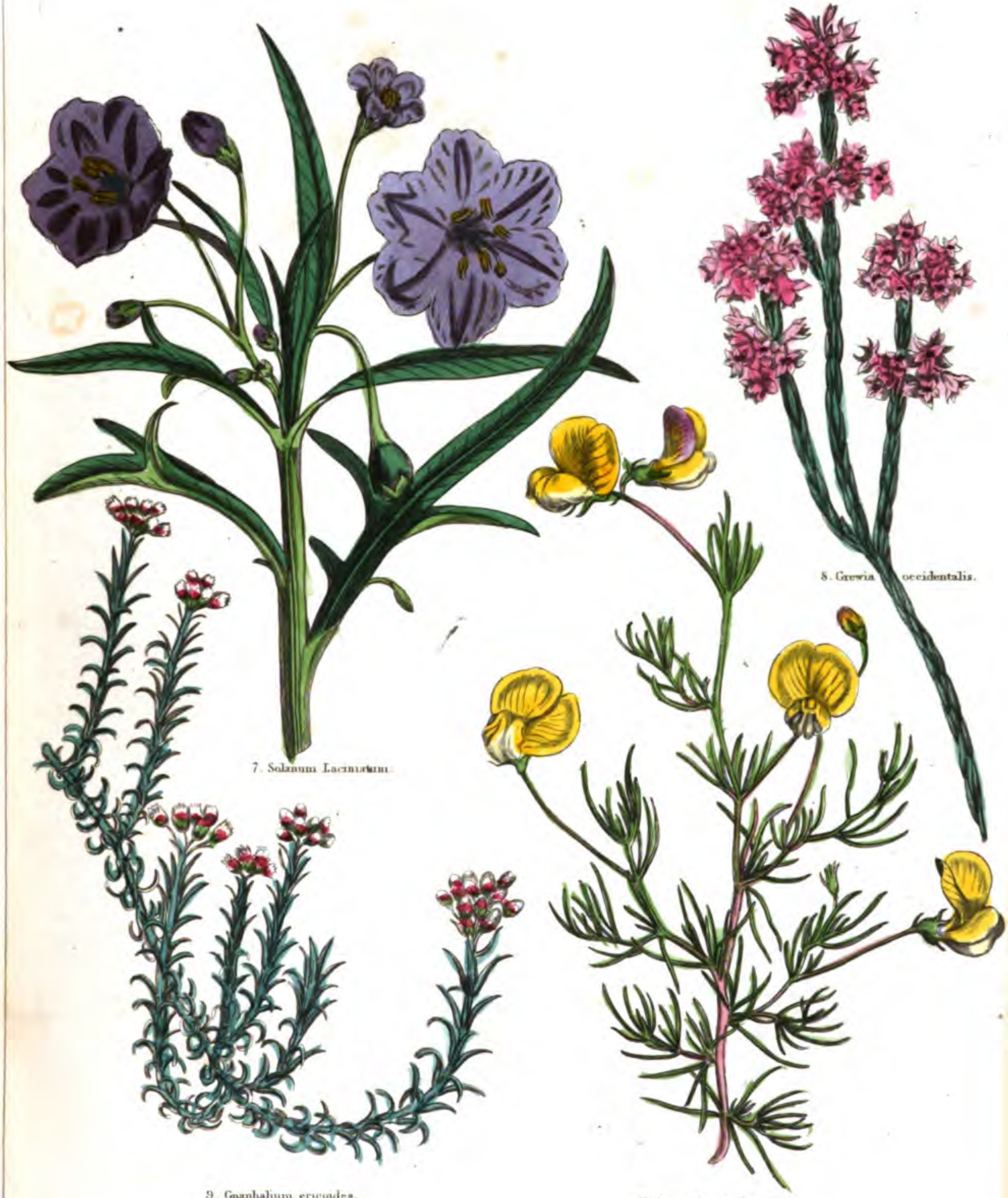


3. Scabiosa atropurpurea.

4. Erica pyramidalis.

5. Lychnis Alpina.

6. Morea crispa.



7. Solanum Laciniatum.

8. Grewia occidentalis.

9. Gnaphalium ericoides.

10. Aspalathus pedunculata.

THE
MAGAZINE OF BOTANY, GARDENING,
AND
AGRICULTURE,
BRITISH AND FOREIGN.
JULY, 1836.

Address of Earl Stanhope, President of the Medico-Botanical Society, for the Anniversary Meeting, January 16, 1836.

THE Medico-Botanical Society possesses, in Earl Stanhope, a valuable practical officer. As President of that Society he has claims upon the gratitude of its members, far exceeding the usual amount of praise bestowed by other institutions upon their chief officer (if the quantum of usefulness is to be the criterion), for the ability and industry with which he so zealously applies himself to the task he has undertaken. The address which was delivered by that nobleman at the last anniversary meeting, is not only a forcible and elegant composition; but it shows an extent as well as precision of technical knowledge, which we could hardly expect from any one out of the medical profession. As a proof of the devotedness with which he applies himself to the minutest details, we may mention that part of his address wherein he alludes to the action of various plants upon the animal economy, which appears to us to arise from very just and sound views of medical botany; and as they strikingly exhibit the aid which the most abstruse science may occasionally derive from the innate good sense and correct judgment of those not immediately within its precincts, we shall quote some of them with pleasure:—

"A plant may appear, from botanical analogy, to be endowed with active powers, and such may be proved by chemical analysis to be the fact; but its precise operation, the cases in which it ought to be administered, and its actual effects in any disease for which it may be considered useful, can be learned only from repeated trials judiciously made, carefully conducted, and accurately observed. In countries where botany as well as chemistry are unknown, many remedies have been beneficially employed, and their efficacy is evinced by the unerring test of experience; but we may be unable to pronounce with certainty what is their mode of action, or even what is the principle which constitutes their potency. Such is the case with many mineral waters which appear insignificant in their ingredients, but which possess the most sanative properties; and such is the case also with many popular remedies, which from that circumstance alone may not receive due attention in medical practice, but which always afford valuable hints to further investigation, and may frequently be employed with advantage. I may mention, as an instance, that a person with whom I am well acquainted, and on whose veracity I can implicitly rely, assured me that while suffering from a hoarseness which rendered his voice almost inaudible, he had the curiosity to try a remedy that is mentioned by the celebrated John Wesley, in a work intitled 'Primitive Physic.' It consists in rubbing the soles of the feet with garlic and hog's lard, before a fire at bed-time, and the result was that the hoarseness was immediately removed, and that in less than two minutes afterwards the taste of the root was perceptible in the palate. It would be difficult, it may perhaps be impossible, to explain in this case the *modus operandi*, the manner in which the taste of the garlic was so rapidly transmitted, or the cause by which the complaint was so suddenly cured, but some instruction is to be drawn from this fact, which is noticed only as an illustration. It will not be supposed that I recommend an empirical practice, but I would not omit any opportunity of renewing my recommendations, which I cannot too frequently or too forcibly urge, of submitting to actual trials those substances which may be administered with safety, and which are supposed to be successful in the treatment of diseases; and also of investigating fully and of employing scientifically those remedies which have been found to be useful, although they are not contained in any Pharmacopœia, and have been administered by unlearned persons who have acquired only by tradition a knowledge of their virtues.

"Rheumatism, which is always so painful and often so difficult to cure, which cripples the limbs of the patient, and in many cases deprives him of repose, is the subject of two papers that were communicated to this Society—the one from Dr. Lombard, of Geneva, and the other from Mr. Maynard, in a letter to Mr. Battley. Dr. Lombard found, that in acute articular rheumatism, the spirituous extract of the *aconitum napellus*, prepared as he directs, was eminently efficacious, and he states, that all the patients were speedily cured, 'without the supervention of any bad symptoms;' that he never knew a single case which had resisted his plan of treatment, and that he prefers that remedy to opiates, sudorifics, and tartarized antimony. In two cases, both of which had lasted a fortnight, the patients were cured in 48 hours: one of them by taking half a grain three times a day, and the other by taking 2 grains every two hours. He condemns the usual mode of preparing the spirituous extract, and thinks that the volatile principle of the plant is preserved by the process which he adopts; but it may be doubted whether it is not very much diminished, if not wholly lost, by the two evaporations that he employs, and whether its active principle, which, according to the opinion of some chemists, is destroyed by heat, does not suffer from undergoing a slight boiling. The largest dose which he administers is 9 grains every two hours, but he says that 3 or 4 scruples, or even 1¼ drachm may be given in a day without any injurious effects; which, however, does not prove it to be innocuous, for we know that such is also the case with some other medicines which, frequently repeated, produce dangerous and even fatal consequences; and he allows that the *aconitum napellus* has a powerful action on the nervous system. He states, that it does not destroy what he calls the rheumatic *virus*, but only neutralizes its morbid action, and often alleviates the pain within an hour. It may perhaps operate as a narcotic; but from the trials which he made, it cannot be considered as a sudorific, although it was supposed to be such by the celebrated Störk. It was observed by Dr. Lombard to produce only in one case perspiration, and in another case the perspiration, which had previously existed, ceased after the use of the remedy, and, as he believes, in consequence of its operation. It must be remarked, that the plant, which was named by Linnæus the *aconitum napellus*, is, as we are informed by Mr. Batka, of Prague, a different species from that which was employed by Störk, and which is the *neomontanum* or *intermedium*, names which are not found in the *Hortus Britannicus* of Sweet; but the *napellus* is also a synonym of the *neubergense* which grows in Styria.

"Of much greater merit is the communication of Mr. Maynard, on the leaves of a plant from the Cape of Good Hope, which is called *buchu*, and which, infused in spirits, has in this country proved extremely successful in rheumatisms, even in the cases of elderly persons who were become cripples, but who in a short time were enabled to return to their labours. It is applied externally and by friction, and is therefore far safer in its application than the *aconitum*, besides having the advantage of being a domestic remedy, which even in unskilful hands cannot be injurious. Mr. Maynard is led to 'believe that there are virtues in the plant beyond what it has credit for at present,' and the facts which he mentions prove that such must be the case; so that it would be extremely desirable to ascertain its scientific name, and also whether it could be cultivated in this island. Most earnestly do I wish that some person who is eminently qualified for the investigation, would instruct us on its chemical analysis, and that large quantities of the buchu leaves were sent to this country, for the use of the medical profession, and for the relief of those who are afflicted with rheumatism. In chronic disorders of that description, Dr. Negri found that beneficial effects were produced by the balota lanata, administered in decoctions of from ½ oz. to 1 oz., half at night and half in the morning, and that it operates both diaphoretically and diuretically; from which latter quality it was considered useful in dropsies.

"The bark of the *prunus padus*, or common bird cherry, which has a strong spicy smell, and a taste resembling that of bitter almonds, is stated by Dr. Murray, in his *Apparatus Medicaminum*, to be employed in Loraine and Sweden as a remedy in intermittent fevers. Dr. Bremer, who published in the German language a most interesting tract on that plant, found that it very often failed in those disorders, but that it was of great efficacy in cases of rheumatism, and that when distilled it operated as an antispasmodic, and also as a vermifuge. When given in rheumatism, it ought not to be administered if there is inflammation, as it is then injurious, and it acts generally as a diaphoretic, sometimes as a diuretic, and in most cases accelerates the circulation. The bark is to be collected in the spring, before the leaves appear, is to be used when fresh, and is to be taken in an infusion or decoction. Such were the beneficial effects which it produced, that relief was experienced in 24 hours, and one-third of the patients, of whose cases he has given a very clear and detailed statement, were cured in less than a fortnight. This very useful discovery was the result of accident, and arose from his observing its salutary influence upon those patients who suffered from rheumatism, but to whom it was administered, from their having at the same time intermittent fevers; and it affords another proof, if indeed any could yet be wanted, of the extreme importance, nay, of the absolute necessity, of actual trials."

Speaking of the value of botany as a science, he observes:—

"It is only when applied to purposes of practical utility, which are alone of real importance, and which ought constantly to be the objects of our pursuit, that botany can be of value, for it would have very little merit, and have no claims on our attention, if it were to be confined, as is too frequently the case, to the complete enumeration and minute description of plants, or even to their systematic arrangement, which, notwithstanding all the care and industry that have been bestowed upon it, seems to be still far removed from the perfection which is so much to be desired, and will, I have no doubt, be ultimately attained. The imperfection of the present nomenclature and classification is evinced not only by the multitude of synonyms, but also by innumerable cases, in which the same plant is arranged in a different genus, by some botanists, from that which others have considered to be more appropriate. Hence arise that uncertainty and confusion which is so injurious to botany itself, and so inconvenient to those who study it; and hence we may reasonably infer that the present system is not entirely satisfactory even to those who are the most competent authorities upon the subject. Although Linnæus classed the whole vegetable kingdom into 57 natural orders, they have since been increased to the number of 229, some of which have been again divided into tribes, sections, and sub-orders, while there are 34 orders, each of which contains only two genera, and about as many other orders, comprising only a single genus, and in some cases a genus which has but one species. While some plants, like mignionette, and pomegranate, and the *cobæa scandens*, appear to be thus unsociable, there are others which, notwithstanding all their dissimilarities, are classed together; and the elm, the hop, the fig, and the nettle, are included by Jussieu in the same order, and according to what is called a natural arrangement. According to another classification, the elm belongs to the order *ulmideæ*, the fig to the *artocarpeæ*, and the hop, with the nettle, to the *urticæ*. Classification is the more important, because plants which are similar in their characters are so likewise in their qualities, and ought therefore to be arranged in such a manner as to facilitate the investigation by analogy. The advantages that are derived from that analogy would of themselves offer a sufficient recommendation to the study of botany, which is also of extreme utility in establishing those precise and accurate definitions by which each plant may be recognized, and may also be effectually distinguished from every other. The study must, however, be pursued with reference to some practical object, without which it becomes uninteresting to ourselves and unprofitable to others."

The whole discourse deserves to be attentively perused; and, as descriptive of the existing state of our knowledge of medical plants, and furnishing the best materials for such hopes and expectations as the friends of this science may reasonably indulge in, we think that the address has all the merit of a record.

ON THE EATABLE HIBISCUS.

This is a stove annual, a native of the West Indies, and introduced in 1692. A soft herbaceous stalk rises from three to five feet high, with crenate leaves, and axillary, pale sulphur-coloured flowers, succeeded by capsules. These, in the West Indies and the south of France, are put green into soups, or eaten with butter. In the south of France it is cultivated in the open air for this purpose; and at Paris it is treated as we do the capsicum and love-apple. A similar treatment would, no doubt, succeed in this country.

ON THE EARTH ALMOND.

The earth-almond, or rush-nut, is a fibrous-rooted grass, with small round tubers hanging from the fibres, about the size of peas, which taste like chestnuts or almonds. It is a native of Italy and Montpelier, and is cultivated in some parts of the south of Europe and Germany, for food. The tubers are planted in spring, and taken up in October, and preserved for winter use in the manner of potatoes. It might probably be cultivated in this country in dry warm situations, or in a frame.

ON THE SWEET POTATO.

The Spanish, or sweet potato, is the convolvulus batatas L. It is an herbaceous perennial, with a round stem, hispid, prostrate, creeping, of a whitish green, putting out scattered, oblong, acuminated tubers, purple or pale on the outsides. The leaves are angular, on long petioles; the flowers purple, on upright peduncles. It is a native of both the Indies, and was introduced here, and cultivated by Gerarde in 1597. He calls the roots potatus, potades, or potatoes, and says, that they are by some named skirrets of Peru. They flourished in his garden till winter, when they perished and rotted. Batatas were then sold at the exchange in London, and are still annually imported into England from Spain and Portugal. They were the common potatoes of our old English writers; the solanum tuberosum being then little known. The tubers of the batatas are sweet, sapid, and nourishing. They are very commonly cultivated in all the tropical climates, where they eat not only the roots but the young leaves and tender shoots boiled. There are several varieties, if not distinct species, differing in the size, figure, and taste of the roots.

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Catalogue of the most Remarkable and Interesting Plants, Indigenous to Worcestershire, with their Habitats.

(*Continued from p.* 86.)

Ligustrum vulgare, Common Privet. Abundant in the hedges.

Circæa lutetiana, Enchanter's Nightshade. Perry Wood, Shrawley Wood, and other moist shady places.

Veronica Anagallis, Long-leaved Brooklime. Pools near Powick, on the Malvern Road. Ashmore common. Near Pershore. Duck Brook, near Worcester.

V. montana, Mountain Speedwell. Described by Purton as "very rare." Wood at the west end of Powick Ham, near Worcester; where it has since been found by Dr. Streeten; but Mr. France having recently built upon this spot, and made alterations in the ground, the plant has disappeared. In a wood nearer to Malvern. By the side of a stream, in a place called "the Gullet," between the Swinnet and Holly Bush hills, in the Malvern Range, southward of Little Malvern.

Pinguicula vulgaris, Butterwort, or Yorkshire Sanicle. On the north-west side of Malvern Hills, in the bog below the Worcestershire Beacon, but in no other part of the range. Also on Feckenham bog.

Valeriana dioica, Marsh Valerian. In a marshy field close to Laughern Brook, near Worcester, above Bubble Bridge.

V. officinalis, Great Valerian. Nunnery Wood, and the banks of the Severn. The narrow-leaved variety on Bredon Hill.

Crocus vernus, Purple Spring Crocus. Very rare. Several plants were found a few years ago in the middle of a meadow between Worcester and Crookbarrow Hill. The roots were so very deep in the earth as not to be extracted, which is probably the reason the plant so seldom flowers, as it has not since been met with in the spot mentioned.

Scirpus Holoschœnus, Round-cluster-headed Club-rush. Discovered in marshy places at Throckmorton, near Fladbury, by Dr. Sheffield, Provost of Worcester College, Oxford.

S. setaceus, Bristle-stalked Club-rush. At Cookhill. Pedmore Common.

S. Sylvaticus, Wood Club-rush. Rare. Near Alcester. By the large Pool in Shrawley Wood.

Eleocharis palustris, Creeping Spike-rush. Banks of a pool at Kinnersley.

Eriophorum polystachion, Broad-leaved Cotton Grass. Bog at the base of the Worcestershire Beacon, Malvern.

E. angustifolium, Narrow-leaved Cotton Grass. Abundant in a large bog on Hartlebury Common.

Nardus stricta, Mat Grass. On Hartlebury Common, and Malvern Hills.

Milium effusum, Spreading Millet-grass. Woods and groves, Perry Wood.

Alopecurus agrestis, Slender Fox-tail-grass. Corn-fields, at Brook-end, near Kemsey.

A. geniculatus, Floating Fox-tail. Severn meadows, Kemsey.

Aira cristata, Crested Hair-grass. On the red marl cliff at the Ketch, two miles south of Worcester.

A. flexuosa, Wavy Mountain Hair-grass. Shrawley Wood, Malvern Hills.

Melica cærulea, Purple Melic-grass. Marsh near Pedmore Common.

Glyceria aquatica, Reedy Sweet-grass. Pools and ditches in the vicinity of the Severn.

G. rigida, Hard Sweet-grass. Near the Ketch, on the Bath Road, between Kemsey and Worcester.

Festuaca calamaria, Reed Fescue-grass. Shrawley Woods, where it was discovered, in 1801, by the late Mr. Moseley, of Wynterdyne, who sent it to Sir J. E. Smith. Never flowering except when the coppice wood has been recently cut down.

F. pinnata, Spiked Heath Fescue-grass. Near Pershore.

Bromus dianarus, Upright Brome-grass. Severn Stoke.

B. racemosus, Smooth Brome-grass. Severn meadows, Kemsey.

Arundo Phragmites, Reed. By the side of Brooks, and marshy places, at Hindlip, near Worcester, and on the banks of the Avon.

Montia fontana, Water Blinks. Plashy rills on the Malvern Hills, and on the Common called the Link.

Dipsacus pilosus, Shepherd's Staff. In great abundance by the side of the lane below the Abbey Church, Malvern. Brook at Kemsey.

Asperula odorata, Sweet Woodruff. Woods on the Old Storage Hill, also about Southstone's Rock, and Wassel Hill, near Bewdley. Woods at Stanford, and on Ankerdine Hill.

A. cynanchica, Small Woodruff. Bredon Hill.

Galium pusillum, Least Mountain Bed-straw. Hedgerow on the side of Red-house Lane, Worcester. Now exterminated, by those remorseless foes to botanists—road-surveyors; the lane in question having been raised and widened.

Parietaria officinalis, Wall-pellitory. Old walls near the cathedral.

Potamogeton natans, Broad-leaved Pond-weed. Pool at Wichenford, and Ponds about Malvern.

P. pectinatum, Fennel-leaved Pond-weed. In a pond near the Old Water Works, Worcester.

Myosotis cæspitosa, Tufted Water Scorpion-grass. Ditch in the Severn Meadows, Kemsey.

M. versicolor, Yellow and Blue Scorpion-grass. On the summit of North Hill, Malvern. Ankerdine Hill. Not common.

Lithospermum officinale, Gromwell. Battenhall, near Worcester, and on the lime rubbish about the western base of the Malvern Hills.

Anchusa sempervirens, Evergreen Alkanet. Near the Blankets, Worcester. Under an old elm tree beyond the Old Water Works. Very uncommon.

Cynoglossum sylvaticum, Green-leaved Hound's-tongue. Shady lanes about Worcester. The merciless road-surveyors have however now exiled it. In Deerhurst Lane, close to the Lower Lode Ferry, near Tewskbury. Very rare.

Primula elatior, Oxlip. About Leigh Sinton, Cradley, &c. in pastures on limestone.

Lysimachia vulgaris, Great Yellow Loosetrife. By the side of the wier above Powick Bridge, and banks of the Teme above Bransford. Banks of the Severn below Pixham Ferry. Very rare in this county.

Anagallis cærulea, Blue Pimpernel. On Bredon Hill. Plentiful in a fallow field near the Trench Woods. A singular pale purple variety is found at Shrawley.

Campanula patula, Spreading Bell-Flower. Rare, but abundant in the hedges about Newtown, and in almost all our woods.

C. latifolia, Giant Bell-Flower. Shrawley Wood, where the sandstone cliff shelves down towards the Severn.

Verbascum lychnitis, White Mullein. Rare. Near Malvern. Also about Kinver, and Hagley.

V. virgatum, Large-flowered Primrose-leaved Mullien. A very rare plant. Formerly found by the side of the Kidderminster road at Bevere, near Worcester. It has been gathered in the same habitat so late as 1829, but has now disappeared.

Datura stramonium, Thorn Apple. Occasionally appearing on manured soil, near Worcester, but not really a native.

Atropa belladonna, Deadly Nightshade. Dudley Castle. Also on a wall at Lincombe, near Hartlebury, where it has flourished for many years.

Samolus valerandi, Water Pimpernel. In the rills at Battenhall, near Worcester, and on Defford Common.

Rhamnus catharticus, Buckthorn. In the hedges about Worcester, formerly common, but now scarce through the alterations of improvers.

Euonymus europæus, Spindle-tree. The practice of stubbing up old hedge-rows, and the operations of road surveyors, have almost obliterated this shrub, whose brilliant orange clusters of capsules make so rich an appearance in the autumn. Also near Malvern.

Ribes grossularia, Gooseberry. A frequent straggler from gardens, and an epiphyte on old willows, but occurring also in less suspicious habitats.

Vinca minor, Lesser Periwinkle. In the woods near Leigh Sinton, unquestionably wild. Hedge bank at Little Malvern. Also in profusion at the base of Crookbarrow Hill.

V. major, Greater Periwinkle. Between Cotheridge and Broadwas, by the road side. Hedge bank, near Little Malvern Church.

Chærophyllum sativum, Garden Chervil. In great profusion on the sides of the Tewkesbury Road, just beyond the turnpike, Worcester, first noticed by Dr. Stokes, in 1775. Still there in equal profusion in 1828. But in 1830 the road was altered at this point and lowered, the bank thrown down, a wall built, and every vestige of the plant swept away.

Sium latifolium, Broad-leaved Water-parsnep.—In the moors near Pitchcroft, Worcester. Another obliterated plant. By the wier, at Newman's Bridge, near the Devil's Den, Clifton-on-Teme.

Lathræa squamaria, Greater Toothwort. Growing in some abundance under a white poplar tree by the side of the brook below Bridgestone Mill, Alfrick. At Great Malvern, under an elm by the side of the road near the turnpike.

Pedicularis palustris, Marsh Louse-wert. Rather uncommon. In the boggy marsh at Wyre, near Pershore.

Antirrhinum Cymbalaria, Ivy-leaved Snapdragon. On the old city walls, Worcester, and the south side of the abbey church, Great Malvern, but a garden straggler.

A. majus, Great Snapdragon. Walls about the commandery, cathedral, and bishop's palace.

Digitalis purpurea, Purple Foxglove. In immense quantities about the Malvern and Abberley Hills, and scattered in various other places. White varieties occasionally occur, but are soon rooted up.

Orobanche major, Greater Broom-rape. In Shrawley Wood, by the pool; at Abberley, on the acclivity above the Hundred House; and between Suckley and Bear's-wood.

Alyssum maritimum, Sweet Alyssum. Once found growing on the west bank of the Severn, below Worcester Bridge.

Lepidium ruderale, Narrow-leaved Pepperwort. Rubbish on the side of the Severn above Worcester.

Teesdalia nudicaulis, Naked-stalked Teesdalia. Pensham Field. Abundant on Hartlebury Common, and at the Giant's Grave, Habberley.

Cochlearia Armoracia, Horse-radish. On the banks of the Severn, truly wild.

Cardamine impatiens, Impatient Ladies' Smock. Western side of the Severn, below Worcester Bridge. Also in Shrawley Wood, and on Rosebury Rock.

C. amara, Bitter Ladies' Smock. Above Worcester. Below Worcester, in a willowy spot at the Ketch, close to the Severn.

Nasturtium sylvestre, Creeping Yellow Cress. On the banks of the Severn, at Worcester, most abundantly.

N. amphibium, Amphibious Yellow Cress. In ditches by the side of Pitchcroft.

Turritis glabra, Smooth Tower-mustard. Near an old sandstone quarry between the Mitre Oak and Stourport.

Erodium cicutarium, Hemlock Stork's-bill. By the side of the Road, near Hallow, abundantly, and in the road leading to Mr. Farley's, Henwick Hill. Pasture at Kemsey.

E. maritimum, Sea Stork's-bill. Growing in considerable plenty on the rocks fronting the south-west, at the Giant's Grave, Habberley, 1834.

Geranium phæum, Dusky Crane's-bill. Cradley Park, near Stourbridge.

G. sylvaticum, Wood Crane's-bill. In Bewdley Forest, near to Dowles Brook plentifully.

G. pratense, Blue Meadow Crane's-bill. Strikingly conspicuous with its large azure flowers, and a great ornament to the banks of the Severn, and many of our minor brooks.

G. lucidum, Shining Crane's-bill. By the side of the moors, Worcester, and along the lane at Merryman's Hill. At Malvern, Abberly, &c.

G. rotundifolium, Round-leaved Crane's-bill. On a wall at Hartlebury.

G. columbinum, Long-stalked Crane's-bill. By the side of the shady walk beyond the Old Water Works, and in several lanes about Worcester and Hallow. On Abberley Hill.

Malva rotundifolia, Dwarf Mallow. Not frequent in this county. At the base of the North Hill, Malvern. About Kemsey.

M. moschata, Musk Mallow. At Henwick Hill, Helbury Hill, and various other places, chiefly by the road side.

Fumaria solida, Solid Bulbous Fumitory. In Abberley Woods; in Purton.

F. claviculata, White Climbing Fumitory. Abundant among the loose stones on the declivities of the Malvern Hills.

F. capreolata, Ramping Fumitory. In a hedge at Shrawley, and near Abberley.

Genista spinosa, Prickly Broom. Whittington Common, near Stourbridge, plentiful, but observed nowhere else. The *G. tinctoria* and *G. anglica* are very common.

Anthyllis vulneraria, Kidney-vetch. Abundant on the grauwacké limestone on the western flanks of the Malvern Range, and equally plentiful on the lias at Cracombe Hill.

Lathyrus nissolia, Crimson Grass Vetch. One of our most beautiful and elegant native plants. The brilliancy of the crimson blossoms fading into purple, has a charming effect when seen in perfection amidst the grassy herbage where it lurks. In great abundance in a wood near Pershore.

L. sylvestris, Narrow-leaved Everlasting Pea. Perry Wood, and Helbury Hill, on the east side of Worcester; in the woods about Bredon Hill; and Tiddesley Wood, near Pershore.

L. latifolius, Broad-leaved Everlasting Pea. Severn Stoke Copse.

Vicia sylvatica, Wood Vetch. A beautiful plant, climbing up the branches of trees, and presenting its clusters of blue-streaked flowers for the admiration of those who follow Nature into her most retired recesses. On Bredon Hill. In the Devil's Den, Clifton-on-Teme, and in a wood near the Spout, Malvern. In the greatest luxuriance at Lower Sapey, covering the shrubs and trees for a considerable distance along the banks of the brook celebrated for containing the sacred impressions of St. Catherine's mare and colt.

V. angustifolia, Narrow-leaved Crimson Vetch. Near the Giant's Grave, Habberley. Ankerdine Hill.

V. lathyroides, Spring Vetch. Battenhall Lane, Cracombe Hill, and numerous other places in the county.

V. bithynica, Rough-podded Purple Vetch. Woods at Clifton-on-Teme. Below the Ivyscar Rock, Great Malvern.

Ornithopus perpusillus, Bird's Foot. On the Malvern Hills, Hartlebury Common, Kemsey Common, and Blakebrook, near Kidderminster.

Hippocrepis comosa, Tufted Horse-shoe Vetch. South side of Bredon Hill.

Hedysarum Onobrychis, Saintfoin. Abundant on the Abberley Hills. Also on the limestone west of the Malvern Chain, and on the lias at Cracombe.

Astragalus glycyphyllos, Liquorice Vetch. Helbury Hill, Worcester, the Trench Woods, &c.

A. hypoglottis, Purple Mountain Milk Vetch. Bredon Hill, near the Camp. Still there, about two fields southwards of the outer vallum, but not easily found or got at without scaling the stone walls at some personal risk. The only habitat the county possesses.

Trifolium ochroleucum, Sulphur-coloured Trefoil. On the Link, at Malvern.

T. arvense, Hare's-foot Trefoil. At Malvern, Powick, and on Hartlebury Common.

T. fragiferum, Strawberry-headed, Trefoil. On the Spetchley Road before the late enclosures. Evesham, on the Stratford Road.

Lotus major, Greater Bird's-foot Trefoil. In the Gullet, a woody glen of the Malvern Range, and at the base of Abberley Hill. Tiddesley Wood, near Pershore.

Hypericum calycinum, Large-flowered St. John's Wort. In a copse at Little Malvern, but doubtful if truly wild.

H. Androsæmum, Tutsan or Park Leaves. In a hedge at the western base of the Worcestershire Beacon. Great Malvern. On Abberley Hill, growing among the underwood, to a great size. Also on Bredon Hill, above Elmley Castle.

H. quadrangulum, Square St. John's Wort. Lane at Kemsey, and many marshy spots in the county.

H. dubium, Imperforate St. John's Wort. At Sapey, near Clifton.

H. humifusum, Trailing St. John's Wort. On the North Hill, Malvern. Also near Nunnery Wood, and on Helbury Hill.

H. montanum, Mountain St. John's Wort. Shrawley Wood, and Abberley Hill.

H. hirsutum, Hairy St. John's Wort. Woody places about Worcester, not unfrequent.

Lactuca saligna, Narrow-leaved Lettuce. On a ditch bank by the road side, at Spetchley, near Worcester.

Hieracium murorum, Broad-leaved Wall Hawkweed. On the rocks at Malvern.

Lapsana pusilla, Dwarf Nipple-wort. Pensham Field, near Pershore.

Cichorum Intybus, Wild Succory. Border of a corn field near Pendock. Also near Crookbarrow Hill.

Serratula tinctoria, Saw-wort. Borders of Perry and Nunnery Woods, &c. Abundant on the bank at Rainbow Hill, previous to the alteration of the road.

Carduus acanthoides, Welted Thistle. In the hedges near the Severn, below Worcester.

C. marianus, Milk Thistle. On the marly bank by the side of the London Road, at Red Hill, near Worcester.

Cnicus eriophorus, Woolly headed Thistle. Bredon Hill. Hillend Bank, Longdon. Foot-way between Clarkton Leap and Kemsey. On the road from Worcester to Norton.

C. pratensis, Meadow Plume Thistle. By the brook at Upton Snodsbury.

C. acaulis, Dwarf Plume Thistle. On Welland Common, near Little Malvern.

Carlina vulgaris, Carline Thistle. On the Malvern and Abberley Hills, &c.

Bidens cernua, Nodding Bur-marigold. Ponds in the vicinity of Martley. In a ditch near Pitmaston.

Tanacetum vulgare, Tansy. Very abundant on the banks of the Severn and Teme. This bitter herb is still employed to make a tea, which is praised for its strengthening qualities. It has the advantage of costing nothing.

Artemisia absinthium, Wormwood. About Malvern and Alfrick, near farm houses.

Gnaphalium margaritaceum, Pearly Everlasting. By a rivulet in the heart of Wyre Forest, Worcestershire.

ON THE MARGOSTEEN.

It is a tree rising nearly 20 feet high, with a taper stem, sending out many branches, not unlike a fir; with oval leaves, seven or eight inches long. The flower is like that of a single rose; the fruit round, the size of a middling orange; the shell is like that of the pomegranate, the inside of a rose-colour, divided by thin partitions as in oranges, in which the seeds are lodged, surrounded by a soft juicy pulp, of a delicious flavour, partaking of the strawberry and the grape, and is esteemed one of the richest fruits in the world. It is a native of the Molucca islands, whence it has been transplanted to Java and Malacca. The head of the tree is in the form of a parabola, so fine and regular, and the leaves so beautiful, that it is looked upon in Batavia as the tree most proper for adorning a garden, and affording an agreeable shade. It is esteemed the most delicious of the East Indian fruits, and a great deal of it may be eaten without any inconvenience; it is the only fruit which sick people are allowed to eat without scruple. It is given with safety in almost every disorder; and we are told that persons in the last stage of a putrid fever have found themselves insensibly recovering by sucking this delicious and refreshing fruit. The pulp has a most happy mixture of the tart and sweet, and is no less salutary than pleasant.

ON THE POMEGRANATE.

The pomegranate is a low deciduous tree, rising fifteen or twenty feet high, thickly clothed with twiggy branches, some of which are armed with sharp thorns. The flowers are produced at the ends of the branches, in the shoots of the same year, single or three or four together; frequently one of the largest terminates the branch, and immediately under that are two or three smaller buds, which continue a succession of flowers for some months, generally from June to September. The calyx is very thick and fleshy, and of a fine red colour; the petals are scarlet. The fruit is a berry covered with a hard coriaceous rind, and beautifully crowned with the tube of the calyx, which is sharply toothed, and remains even after the fruit is ripe; contributing greatly to its singular and beautiful appearance. The fruit ripens in October, and, in a greenhouse, will hang on the trees till the spring or summer following. It is a native of most parts of the south of Europe and of China. In Languedoc, and some parts of Italy, it is used as a hedge plant. It was cultivated in England in 1596, by Gerarde; but though it grows very well in the open air, it seldom ripens its fruit so as to render them worth any thing. It used formerly to be kept in boxes, and housed like the orange tree, which is still the practice near Paris and in the Netherlands. Some of the orange and pomegranate trees in the orangery at Versailles, Risso informs us, are believed to be between two and three hundred years old.

History and Description of Modern Wines. By Cyrus Redding Second Edition.

ON WINE AND VINEYARDS

Before we enter upon the subjects of the respective chapters of this work, it is proper to take the opportunity of stating, that at the heads of each of them are placed ornamental designs, beautiful in execution and strikingly pleasing, as well as ingeniously apposite, in their subject, to the contents of the chapter. Mr. Redding commences with an account of the origin and varieties of the vine, and the places in which it has been and is now cultivated. He gives a full account of the best methods of treating it for the purposes of the vintage, with such particulars as render his history highly instructive and interesting. The course of the vintage forms the subject of the next two chapters, and it is considered by the author with a copiousness and minuteness of information, such as gives to it a character of great value. The series of processes which are necessary to the formation of the liquor, from the period at which the grapes are gathered to that when the wine is in its perfect state, appear to impose on the manufacturers of it a vast deal of labour and pains. The whole are regularly explained according to the succession in which the operations are performed, and are both numerous and tedious, and require much experience and judgment to do them well. In the year 1823, the latest account which appears to have been accessible to Mr. Redding, the number of hectares of land (two English acres and a half to each hectare) in frame, under vine cultivation, amounted to 1,736,056 or about 4,000,060 of our acres, producing an annual sum of about twenty-two millions and a half of pounds sterling. A portion of this produce, amounting, says Mr. Redding, to 5,229,880 hectolitres, is distilled into brandy, and produces 751,945 hectolitres of spirit, of different degrees of strength, besides 70,015 distilled from the murk, yielding 37,288 of alcohol; the produce in pure alcohol being 469,817 hectolitres. The total value of wines and brandies exported from France into foreign countries in 1823, was 76,639,026 francs, or 3,193,292*l.* 15*s.* sterling. Thus, besides growing corn and vegetables upon a system by no means complete or economical, besides all her sterile lands, (and, in a great part of the middle and south, having a defective husbandry compared to that of England,) France annually exports above three millions sterling of her agricultural produce—a proof of the great fertility of her climate; and when her population is taken into account, a thing by no means discreditable to her industry. Over and above the foregoing quantity of brandy, 93.457 hectolitres are distilled from corn and other substances, besides the vine; and between eleven and twelve millions of hectolitres of beer, perry, and cider are made. From these latter, as well as corn and potatoes, brandy is also distilled, carrying the total amount of brandy of all kinds to 915,417 hectolitres, or 553,086 hectolitres of 27 litres of pure alcohol.

The wines are said to be oppressively taxed in France, the duties upon them amounting in the aggregate to no less than 4,800,000*l.* The short-sighted policy which such an exaction implies is one of those faults of ignorance with which most of the old governments of Europe abound. From this and other regulations of the like nature we are often tempted to believe that they are designedly destined for the discouragement of the industry of the country. At all events, no government could witness the results of the tax on wines, on the scale of those of French wine, for any length of time, without being assured of the folly of the proceeding. As the duty is bad in principle, so is the mode in which it is laid on: for it is so distributed and apportioned, that the grower is encouraged to trust chiefly to the lower rate of wines, for to profit by the choicest quality would scarcely be in his power, in consequence of the heavy duties which are imposed upon it. Mr. Redding strongly recommends the introduction of French wines, which we never can rival, in exchange for English commodities. He states as a curious fact, that the alcohol in wine combined in the natural way, when drank in that state, is not productive of those complaints of the liver, and similar diseases, which arise from drinking the brandied wines of Portugal, in which the spirit is foreign. This is a remarkable fact. The union of the alcohol, mingled with the other ingredients of the wine by artificial means, is never perfect, and is beyond calculation more pernicious than the strongest natural product.

The first of the French wines in excellence and reputation is the Champagne, so called from the place of its growth. It is in the department of the Marne that the most famous of these wines are made—there being dedicated to the growth of the vine for this purpose, 110 hectares of land in the arrondissement of Chalons-sur-Marne; 6856 in that of Epernay, 425 in that of St. Menehould, 9029 in that of Rheims, and 2646 in that of Vitry-sur-Marne. The reader, we are sure, will be desirous of knowing something of the history of a process, by which he has probably been more than once much gratified. It appears that about Christmas, after the vintage, the fermentation being complete, the wine is racked, is always done in dry weather, and if possible during the frost. A month after it is racked a second time, and fined with isinglass. Before it is bottled it undergoes a third racking, and a second fining. There are some makers of wine who only fine it once after the second racking, and immediately bottle it, taking care that it has been well fined in the cask; others rack it twice, but fine it at each racking. The best wines are always able to bear three rackings, and two finings; and the benefit of such a repetition is found of the utmost importance afterwards, in managing the wine when bottled.

The greatest caution is taken to provide stout bottles of uniform thickness for the wine that is to effervesce, and the slightest malformation in a bottle, which is sure to be found in an inquiry of the most scrupulous exactness, at once determines its rejection from the honours of such a trust as it had been destined for. With respect to the cause of the effervescence, Mr. Redding tells us that it is owing to the carbonic acid gas, produced in the process of fermentation. This gas being resisted in the fermentation of the white wine, scarcely begins to develop itself in the cask, but is very quickly reproduced in bottle. In this process the saccharine and tartarious principles are decomposed. If the latter principle predominates, the wine effervesces strongly, but is weak; if the saccharine principle be considerable, and the alcohol found in sufficient quantity to limit its decomposition, the quality is good. The wines do not effervesce in uniform times; some will do it after being in bottle fifteen days, others will demand as many months. One wine will require a change of temperature, and must be brought from the underground cellar to a cellar on the surface; another will not exhibit the desired quality until August.

The bottles being filled and properly corked, are arranged in heaps, and in such a way as to allow any of them to be withdrawn from the heap for the purpose of being examined. In July or August, the season of breakage comes on, and sometimes considerable losses are sustained by the visitation. It generally ceases, however, in the month of September, and in October they "lift the pile," as it is called, which means taking the bottles down, one by one, putting aside the broken ones, and setting on their bottoms those which appear, in spite of the cork and sealing, which are entire, to have stirred a little, upon examining the vacant space in the neck. Bottles are sometimes found in this state to have diminished in quantity to the amount of one-half, by evaporation. This loss must be replaced. In the other bottles there is observed a deposition which it is necessary to remove. For this latter purpose the bottles are first placed in an inclined position of about twenty-five degrees, and without removing them a shake is given to each twice or thrice a-day, to detach the sediments. Planks, having holes in them for the necks of the bottles, are placed in the cellar to receive them, thus slopingly, three or four thousand together. For ten or fifteen days they are submitted to the before-mentioned agitation, which is managed by the workmen with some dexterity, so as to place all the deposition in the neck, next to the cork, and leave the wine perfectly limpid. Each bottle is then taken by the bottom, kept carefully in its reversed position, and the wire and twine being broken, the bottle resting between the workman's knees, the cork is dexterously withdrawn, so as to admit an explosion of the gas, which carries the deposition with it. An index is then introduced into the bottle, to measure the height to which the wine should ascend, and the deficiency is immediately made good with wine that has before undergone a similar operation. As it was by no means an easy task to do this, from the evaporation of the gas while the bottle was open, an instrument has been invented, and is everywhere used for the purpose, which it is not necessary to describe here. The bottle is now a second time corked, and wired.

Mr. Redding next presents us with a very full account of the well known wine called Burgundy, the most perfect, he observes, of all wines, for those qualities that are deemed most essential to their perfections. The flavour of Burgundy is delicious, the bouquet exquisite, and the superior delicacy which it possesses justly entitles it to be held in the highest estimation. The fine wines of Upper Burgundy, in the arrondissement of Dijon, are the produce of about seven hundred hectares, while in the arrondissement of Beaune seven thousand are cultivated for making the prime growths. The arrondissement of Dijon produces the red and white Chambertin. They also make there an effervescing Chambertin, a wine only inferior to very good Champagne, but it wants the delicate bouquet of champagne, by the absence of which it is easily detected. The French complain of its having too much strength, but this would recommend it in England. It is a very delicate wine notwithstanding, and highly agreeable to the palate. It has been recently imported into London, and is much commended.

In Beaune the wine country is much more extensive than at Dijon, and its aspect is north-east by south-west. The first commune of the wine country is Vaugeot, in which the vineyard is seen forming an enclosure of about forty-eight hectares. Here is produced the celebrated wine called Clos Vougeot. Above this is another choice spot, called the Essejaux, a famous source of wine, and belonging to the notorious Ouvrard. In the commune of Aloxe, a wine called Corton is grown, which is in the highest repute. The ground from which it is made gives only ten or twelve litres of wine each hectare, of which there are but forty-six. Nothing is more remarkable or unaccountable than the difference of production in these fine wine districts. The most delicious wine is sometimes grown on one little spot only, in the midst of vineyards which produce no others but of the ordinary quality: while, in another place, the product of a vineyard, in proportion to its surface, shall be incredibly small, yet of exquisite quality; at the same, time in the soil, aspect, treatment as to culture, and species of plant, there shall be no perceptible difference to the eye of the most experienced wine-grower. In such a district as the Cote d'Or, it is difference of site rather than of treatment, to which the superior wine owes its repute, for there is no want of competition in labouring after excellence.

There is, continues Mr. Redding, an infinite variety in the wines of Burgundy, which an Englishman can hardly comprehend. Accustomed to wines less delicate than intoxicating, and regardful rather of the quantity than quality of the wine he takes, his favourite beverage is chosen rather for strength than perfection of flavour. The nature of the soil, the aspect, the season, the plant, and mode of culture, as well as the making, each and all equally affect the quality of these wines more than wines in general, on account of their great delicacy. The most finished and perfect Burgundy, the French say, is deteriorated by so short a voyage as that across the channel from Calais to Dover, including, of course, the journey to the former place, and they are never sent away but in bottle.

The making of the Burgundy called Cote d'Or, which is one of the most superior of the kind, is on a coarse scale indeed. The grapes are usually trodden before they are thrown into the vat. The gathering takes place in the hottest sunshine. The fermentation in the vat, which is usually left uncovered, lasts from thirty to forty-eight hours if the weather is hot, and from three to eight days if it be cold, for the first class of wines. The management in the cask consists of racking in the month of March following the vintage, and a second racking in September, repeated every six months, for the red wines. The casks are kept exactly filled, and the wine is fined. Many persons make the first racking soon after the first frost happens, fine immediately, and rack again in the month of March, and then in the month of September.

The secret of the excellence of Burgundy wine Mr. Redding attributes to the unknown properties of the soil, which are developed, only in particular places, often in the same vineyard, at all events, within a very narrow district. Whatever be the cause, France has in these wines a just cause of boast, and a staple in which she will never be excelled. While much is, doubtless, owing to the climate and aspect, it is evident that the peculiar characteristics of Burgundy depend least upon the art or labour of man, since wines inferior in quality receive as much or more of his attention. There is very little of the first class of these wines exported from France, in this respect differing from Champagne, where the best finds its way into foreign countries. There are several reasons for this, and among the foremost, the small quantity produced, which the French, who are choice in wines, know very well how to distinguish, but which foreign merchants very rarely do.

The justly celebrated *Hermitage*, both the red and the white sorts, is made from grapes which grow on a hill, near the town of Tain, in the arrondissement of Valence, situated on the banks of the Rhone, with a southern aspect. It appears, that in this place there still exists a tradition, the burden of which is, that an inhabitant of Condrieu, having determined to turn hermit, established his cell on an uncultivated hill near Tain. He amused his leisure hours by breaking stones and rocks to pieces which surrounded his dwelling, and planting among them some vine slips from Condrieu; they succeeded to admiration. His example was copied by others, and the sterile hill side was soon converted into a vineyard. The good taste of the monks in wine has been already remarked in other places. Hermitage wine is divided into five classes, but it differs much with the seasons as to quality. Red Hermitage will not keep more than twenty years without altering. The price of the first class is often as high as five hundred and fifty francs the piece of two hundred and ten litres. The other growths or classes sell from four hundred and fifty down to three hundred, and even as low as two hundred and fifty francs the piece. When the season is bad, and the wine of moderate quality, the wine of the first growth will not bring more than two hundred and fifty, and of the last, one hundred and twenty francs. All these are only to be considered the prices when new at the vintage, and as approximating to the mean prices in the relative cases. Red Hermitage, when it is of the first quality, is not bottled for exportation until it has been four or five years in the cask, in which, as well as in bottles, it is generally sold at that age.

Amongst the numerous list of wines mentioned by Mr. Redding, who, we believe, leaves scarcely a village beverage of the simplest kind that he does not mention and fully describe, is one, a sparkling white wine. The process of making it seems a very simple one, and, perhaps, is not wholly unsusceptible of being practised in this country. A quantity of white grapes is selected, and exposed on planks to the sun, if possible, for four or five days. They are then plucked from the stems, and put into a vat, where they are bruised with the hands or feet. They are then left for twenty-four or thirty hours, to give time to the skins to rise and separate the murk from the fluid parts. The wine is then racked into large bottles, which are decanted every two days until the sensible fermentation is terminated. The wine being then clear is put into very strong bottles, which, on the following day, are corked, tied, and sealed.

The wines of the Gironde include those of the districts which are in the vicinity of the Bordeaux. These are most known of all French wines to foreigners, they being of the quality which best endures the carriage necessary for their transportation to different countries. From the account of Mr. Redding, it seems that the claret which we obtain in this country from France, is so called from the word *clairet*, and is a mixture of several sorts of wine, often of Beni Carlos and Bordeaux, made up for the English market; sometimes Languedoc and Bordeaux; at others, Hermitage or Alicant with Bordeaux, and uniformly a portion of spirit of wine in addition. Mr. Brande reckons only 12·91 of spirit in claret wine. This quantity cannot be uniform; it must frequently be more, and rarely less than that quantity, as claret is a manufactured wine, and not the work of one manufacturer alone, who might, in all probability, regulate his proportions by some uniform standard.

From the wines of France, which have been treated with an extraordinary degree of minute knowledge by Mr. Redding, that gentleman proceeds to those of Spain. In consequence of the favourable nature of its genial climate, the vintage of Spain very rarely, or almost never fails; but there is a great backwardness in the knowledge of the people, who, for the most part, are satisfied to trust to nature, more than to human art or labour. Nevertheless, both the red and white wines in Spain are of surpassing excellence. The wines in common use are not the white luscious ones, nor the dry wines of Xeres. In the province of La Mancha, the celebrated wine, *Val de Penas* is made. This is a red wine, of excellent body, perhaps with as much as Port, before it is made fiery with brandy. In the hands of Frenchmen it would be found to equal in strength, flavour, and body, the best southern growths. The vineyards are close to Manzanares, a town almost in ruins, in which the Duke of San Carlos, upon whose estate the wine is made, keeps extensive cellars, where it may be tasted in perfection. It is a wine which requires age to perfect, and then it is equal to any red wine in the world, for every quality save, perhaps, the delicacy which distinguishes the higher class of Burgundy. It is grown upon a rocky or stony soil, as *Val de Penas*, or "Valley of Stones," indicates. The better class of the inhabitants of the Castiles rate it very highly. No idea can be formed of this wine from what is drunk at Madrid. The vines employ all the inhabitants of the district, where the wages of the labourer are only about seven pence a day.

The wines which are most favoured by foreigners, are those of Andalusia. The Malaga wine is usually mingled with a proportion of wine which has been designedly burned in the boiling, in order to impart to it a peculiar taste by which it is distinguished. The well known Sherry wine, though deriving its name from Xeres, yet is principally made near Cadiz, or about nine miles from Port St. Mary, at Xeres de la Frontera. The manufacture of this wine appears, from the authentic account of Mr. Redding, to have been the subject of frequent misrepresentation; and under such circumstances it will be interesting to learn the true history of a liquor which few of us can regard with indifference.

"This latter place is in the centre of the vineyards which cover a district of about six leagues square. Forty thousand pipes are made, of which above seventeen thousand are exported annually. It is not to be supposed that these are all wines of the first quality; for they include all that go out of the district, high and low priced. There is a great gradation in the prices of sherry, for though the average is not above twenty-six pounds the butt, the charges are from fifteen up to sixty-five pounds. The value of the sherries exported is calculated at 450,000*l.* and the export duties at 500,000*l.*

"The manufacture of the sherries takes place under the care of the agents or principals of foreign houses, who reside on the spot, and this is the reason of the great improvement of late years in the wines of Xeres. The vineyards are principally on the sides of slopes or declivities. The grapes are left to hang until they begin to shrivel in the sun. The fruit is white, and always gathered between the 9th and 15th of September. The bunches are exposed to the sun in baskets for forty-eight hours after they are gathered, and turned and sorted carefully for the better wines. The vines, planted about five feet asunder, are carefully dug round immediately after the vintage, and little hollows left to retain the rain. They in January, or soon after, turn up the mould, and carefully weed the ground. The pruning takes place in March, and the earth is afterwards raked over, when the vines are propped until the vintage with canes. The labour of the vineyard is continued even to hunting out the insects on the vines. There is, however, seldom or never a failure in the crop, owing to the benignity of the climate. The high price of good sherry is not wonderful, when the care in the growth and the home duties are taken into account. A bottle of good sherry fetches three shillings and four pence on the spot, though the common ordinary wine of the country is but sixpence.

"The varieties of the wine are produced by the different modes of treating it. Gypsum is frequently, but not always, used in the manufacture. Pale sherry is made from the same grape as the brown, to the wine from which is added a couple of bottles of very pure brandy to each butt. The brown and deeper sherries are also the produce of the same grape, mingled with boiled wine. A butt of pale light sherry is reduced by boiling to a fifth part, by which time it has acquired a deep rich brown colour. One half of the boiled wine is substituted for a like quantity of the pale sherry, which is first abstracted from the butt. The wine thus boiled down is made from a grape that is cheap and abundant, and therefore the price of the best brown wine is but little increased by the operation. This boiled wine is also used for colouring other wines in different degrees for the British market, which seems to abhor the pure unsophisticated juice of the grape, whether in the wines of Porto, Bordeaux, or Spain. In the latter case, however, the wine is not at all deteriorated by the treatment, which cannot be said of the wines of Portugal or of France when worked up to the English taste. The pale sherries therefore are the most pure, containing nothing but the admixture of a little brandy, in addition to the effusion from the press. The different shades of sherry are all caused by the mixture of boiled wine."

It is more probable that Spain will ultimately be the chief source to England for the supply of wines, for even now she is obtaining a striking superiority over Portugal in this respect. This preference we give to Spain, even under all the disadvantages which affect her produce, and which must sooner or later cease to exist. It is calculated, that if half the scientific care and attention which are given to the cultivation of French vines, were bestowed on those of Spain, the latter would soon be completely victorious over every competition. The characteristics of Spanish wines are strength and durability; and what is most worthy of the interest of foreign consumers is, that they not only endure for many years, but even require age before they become possessed of that proper flavour, and the mellowness which recommends them so strongly as a wholesome and delightful beverage. The Canaries produce wines which are usually classed under the head of Spanish. Amongst these are the Teneriffe and Vidonia, but especially the Malmsey, which was once in great repute. But these wines are second in every respect to those of Madeira, a fact which is most probably to be explained by the better management of the vintage; for in the latter place, great incitements have most fortunately arisen to impel the advance of improvement in this article, and a most lucky degree of emulation amongst the cultivators of the vine has been the consequence of a great influx of foreign merchants.

In introducing to our notice the wine produce of Germany, Mr. Redding, inspired by the associations in which he is delighted to indulge, presents to us a beautifully picturesque description of the vineyards on the banks of the Rhine.

"Whoever has visited," he writes, with all the warmth of a poetical mind, "the noble Rhine, must have felt sensible of the beauty of its vineyards, covering steep and shore, interlaced with the most romantic ruins, towns ancient and venerable, smiling villages, and the rapid broad German river, reflecting the rich scenery on its banks. From Mentz even to Boon, the vineyards of the Rhine are observed to greater advantage than any similar cultivation in other countries: Erbach enthroned on its vines; the Rheingau, its Johannisberg on a crescent hill of red soil, adorned with cheering vegetation; Mitelheim, Geisenheim, and Rudsheim with its strong, fine-bodied wine, the grapes from which bask on their promontory of rock, in the summer sun, and imbibe its generous heat from dawn to setting; then again, on the other side, Bingen, delightful, sober, majestic, with terraces of vines, topped by the Chateau of Klopp. The river and its riches, the corn and fruit which the vicinity produces, all remind the stranger of a second Canaan. The Bingerloch, the ruins, and the never failing vines scattered among them, like verdant youth revelling amid age and decay, give a picture no where else exhibited, uniting to the joyousness of wine the sober tinge of meditative feeling. The hills, back of the picture, covered with feudal relics or monastic remains, below Asmannhäusen to Lorch, mingled with the purple grape. Bacharach is near, the wine of which, propably because the fancy of the drinkers has changed, is now pronounced second-rate in quality, though not long ago, even the French celebrated it in their Bacchanalian songs, is still very good, fashion may say what it chooses. Landscapes of greater beauty, joined to the luxuriance of fruitful vine culture, can no where be seen; perhaps there is something to be added, for the alliance of wine and its agreeable qualities, with the noble scenery of the river. The mind will have its associations upon all subjects.

In no part of his history has Mr. Redding devoted more attention to the geological relations of the vine, than when he comes to the consideration of the soil of Germany, and its effect on the cultivation of the grape. He is of opinion, that granite decomposed, and quartz in favourable sites, offer good vine land, and so does sienite. Clay slate, mingled with quartz, is observed to be highly favourable with basalt. Where marl, mingled with pebbles, occurs, the vines succeed best; nearly the same character, but, if any thing, still a better, may be given to dolenite. Variegated sandstone in decomposition does not do well for the vines in dry seasons, though light in its nature; when mingled with clay, or other earths, its produce is tolerable, but it gives no remarkable wine. Shell marl, where the calcareous properties are most prevalent, when mixed with the clay soil, will grow tolerably good vines, and the same when they are reared upon a coarse limestone well worked. Kiffer produces only weak wine. Schistous marl, where it occurs decomposed, yields a fertile soil for the vine. When mingled with round stones or sand it is very favourable, but no remarkable wine is produced from it. It is strange that the Germans dress their vines with strong manures, which the French and Portuguese pronounce to be injurious.

The circle of Coblentz contains 17,000 acres, Prussian reckoning, under cultivation for wine, and the produce of each acre is estimated at about 15l. a year. The vintage on the Rhine does not take place until the grapes are perfectly mature; they are then carefully gathered, the bad fruit picked out, and with the stalks put aside. The more celebrated of these wines are all fermented in casks, and then after being repeatedly racked, suffered to remain for years in large fudders, two hundred and fifty gallons, to acquire perfection by time. These huge casks contain each about three hundred and fifty tuns The wines mellow best in large vessels; hence the celebrated Heidelberg tun, thirty-one feet long by twenty-one high, and holding one hundred and fifty fudders, or six hundred hogsheads; the second of these was built at Heidelberg in 1663. That which preceded it held but one hundred and thirty-two fudders. This tun is decorated with all kinds of fantastical ornaments. Tubingen, Gruningen, and Konigstein (the last 3,709 hogsheads), could all boast of their enormous tuns, in which the white wines of the country were thought to mellow better than in casks of less dimensions. These tuns were once kept carefully filled. The Germans always had the reputation of being good drinkers, and of taking care of the "liquor they loved."

German wine has the peculiar character of being generous, dry, finely flavoured, and is capable of enduring age, or rather being improved by it to a greater extent than any other. Mr. Redding is prepared, from certain experiments in his own cellars, to deny the justice of the imputations usually thrown out against German wines, as to the excess of acid contained in them, this unfounded notion having been carried into practical life so far as to cause the use of these wines to be prohibited in the case of gouty subjects. But the author also adds, that the gout is a disease scarcely known on the banks of the Rhine, and yet, upon them, the inhabitants drink hardly any other than Rhenish and Moselle wines. A writer, quoted by Mr. Redding, has no hesitation in giving his testimony to the truth of what he himself believes; and the statement of the gentleman is to the following effect: "We, therefore, conceive this to be a vulgar error, for no wine is better to a gouty patient than that of the Rhine; the author can testify this from his own experience, and the testimony (which can be more depended on) of an eminent English physician, who practised at Mayence for many years, and was of opinion that the strong wines of the Rhine were extremely salutary, and that they contained less acid than any other; moreover, they are never saturated with brandy, as the French white wines are."

For the correctness of every word of this statement Mr. Redding is ready, from personal experience, to vouch, and he has felt himself, that if he take more than a glass or two of port, so that the spirit in it be sufficient to stimulate the stomach, then he feels acidity. But such an inconvenience never attends, he declares, the use of sound Rhenish wine. The peculiar advantage now described as belonging to those wines, results, it appears, from the completeness of the process of fermentation.

On the banks of the River Mayne, not far from Frankfort, is the little town of Hockheim, the source of the famous Hock, a title, by the way, which is much too indiscriminately applied to wines which have no fair title to so fortunate an affiliation. The whole eastern bank of the Rhine to Lorch, and which bears the name of the Rheingau, is celebrated for centuries as a centre of wine produce. Its character was partly owing to its having been at first the property of the church; and it is needless to remind the reader that every part of the world gives proof of the success with which the reverend class of winegrowers always cultivated the grape. In this delightful spot grows the vine called the Castle, or Schloss Johannesberger, once the property of the Prince of Orange. Johannesberg is a town on the right bank of the Rhine below Mentz, and its wine takes the lead of all those produced from the vintages on the borders of the Rhine. The oldest of the Rhenish wines offered to the purchaser is that of 1748, a year distinguished in the annals of the Rheingau, for the most auspicious of vintages on record. Older wines may be met with, but less frequently. The excellence of the wine in any particular year always depends more upon the warmth of the season, than upon any other cause, and the high price of the wine in corresponding years rates accordingly. The Germans say, the wines of the best body are made on the higher lands, and the worst on the lower; the last requiring the longest keeping, to render them mellow for drinking. The wines of 1783 bear a very high character. There is something unaccountable in the extraordinary durability of wines grown so far to the North, when the slightest increase of warmth in a season causes such a difference in the quality of the wine. While strong southern wines suffer from age after a certain period of years in bottle, and begin to deteriorate sensibly, the Rhine wines seem possessed of inextinguishable vitality, and set the greater part of rivalry at defiance, as to keeping. It is generally found that wines with the lesser proportion of alcohol change sooner than those which are strong. The Rhenish wines averaging so little in spirit, will endure longer, and continue to improve by age as much as the more potent wines of the South, with double their alcoholic strength.

The Moselle wines, which have been regarded as inferior to those of the Rhine and Mayne, contain, however, the capital vinous liquor called the Brauneberger. They are light wines, with an excellent flavour, and have recently become objects of attention in England.

Switzerland produces wine, but scarcely any of it is exported. The best Swiss wine is that made in the Grisons, and is called Chiavenna: it is a white wine of an aromatic flavour, and is yielded by the red grape. Red wines of good quality are made at Schaffhausen and at Basle, where the title of "wine of blood" is given to its wine. This title is derived from a sanguinary combat at Birs in the time of Louis XI. of France, when 1,600 Swiss fought 30,000 French, when only sixteen of the former survived, falling more from fatigue than from slaughter by the enemy.

The history of the wines of Portugal is connected with an example of British ignorance on the just policy of commercial laws, such as fills us with surprise, even considering the date of the period when this ignorance was displayed. The Methuen treaty, which is the mild name of the transaction, consisted of an agreement entered into by the British government, whereby it compelled honest Englishmen capable of luxuriating on wine, to drink what Mr. Redding properly calls the "fiery adulterations" of an interested wine company, and, from the coarseness of their wines, exposed to imitations of them without end, from materials some of which had never been in Portugal. These sophistications, complained of in 1730, increased after the monopoly was granted to the company. The delusion of encouraging our woollen manufactures, was the bait held out in exchange for the rejection of better wine, and the substitution of a third-rate article. The objections to a treaty of such a nature are obvious enough to every impartial reasoner, and the coarseness of the attempts made to justify its continuation, displayed unequalled ignorance and boldness. The time the treaty was in full force, without any attempt to qualify or annul it, almost affords ground for the belief, that Englishmen formerly never scrutinized beyond the surface of things.

Succeeding companies improved on the corrupt practices of their predecessors, and the worst monument of their guilt is found in the confirmed habit which is now fixed upon England, of being partial to Port, no matter how abundant may be the proofs of its want of genuineness and its unwholesomeness. At this very moment Mr. Redding does not hesitate to state, unequivocally, that five-eighths of the wine brought into England is so coarse, and is such a medley of ill-flavoured heterogeneous vine produce, bad Portuguese brandy, and other matters, that any ingenious person may increase one pipe to three by the addition of unexciseable articles, without any fresh injury to the stomach of the consumer, or to the appearance of the wine, happening. A very bold and searching inquiry is instituted by the author, into the fatal results of the monopoly, which in an evil hour, was consigned to this commercial company, and its devastating effects are traced over the vineyard districts, over the proprietors of them, and over the wines themselves, which have been sunk so low in their merits. We regret that we cannot follow our author through the statistical survey which he then commences, of the extent and capabilities of the vineyards of Portugal. The grand objection which he so justly entertains on the subject of Port wines, is the mixture of brandy, which forms a regular ingredient of this wine; it is brandied twice a year, and the effect of this addition is this, that in order to drink the wine of Oporto with the genuine virtues of the grape, it must be taken in the fiery state into which it is converted by the brandy; and with respect to the nature of the said brandy, Mr. Redding states that it is the most execrable stuff that can possibly be offered for human consumption. The reason of its inferior quality is at once announced, in the fact that it is generally distilled from figs and dried grapes, or raisins, these ingredients being refuse, of which no better use can readily be made. The merchants even once tried to make it from locust pods, but that scheme failed, and they were obliged to resort to importation for the extra quantity they wanted. That the wines will keep and bear a sea voyage without the addition of brandy, to such an extravagant excess, there can be no doubt. A couple of bottles of good brandy to a pipe, when put on board of ship, would, if such an assertion were true, answer every purpose of preservation. In some years twenty-seven thousand tuns of Port wine have been imported into Great Britain, in every one of which, besides the portion of spirit in the wine, no less than six gallons of brandy have been artificially mingled, making a hundred and sixty-two thousand gallons of ardent spirit. To get rid of this liquid fire, the wine must be kept a dozen years, and ruined in flavour, when it might be drank in half the time by omitting the brandy. If the Oporto charge made against the English taste were true, how comes it, that even down to 1754 the admixture was censured as flagitious and abominable, even by the merchants themselves? Port wine had then been drank in England for nearly sixty years, and the wines were found warm enough for the taste of Englishmen. The truth is, that quantity being the greatest desideratum, because a good deal of middling wine is more profitable than a small quantity at a high price, brandy aids in making all the growths equal, after being kept a longer or a shorter time, for the inclination of the inferior qualities always is to descend in the market, even below their worth, as the better increase. The mischief is thus easily explained. By this practice, and the ease with which the mass of any people is cajoled, a taste of wine of a most extraordinary kind has prevailed in this country, among the bulk of those in the middling classes who drink wine, and who seem to prefer the juice of the grape the more it resembles the product of the still, rather than of simple fermentation, the very excellence of which consists in the slight interference of artificial efforts for completing its product, after the earth and sun have done their part.

Italy seems to have always disappointed the best calculators, who founded their hopes of the success of vine cultivation on the peculiar climate and soil of that country. England, which imported the oil and silk of that country plentifully, seemed to have no relish whatever for its wines. There is a good explanation for this inferiority in the effects of a bad system of government, which takes away from the husbandman every inducement to take proper steps for improvement. In fact, there is no care whatever bestowed on the cultivation of the vine in Italy, and if there be any good wine of native produce in that country, it is all of nature's, instead of being man's manufacture. The people there prune no vines, make no choice soil for planting them; they make this sort of plant secondary to other productions, and are free of every description of sound knowledge, as to the best way of carrying on the processes of the vintage. The grapes are trodden and are all thrown together in the most slovenly manner; ripe and unripe, sound and unsound, are commonly intermingled, and flung into vats that remain unclean from the last year's vintage, the press being rarely used. The process of fermentation is conducted in the most careless mode. The must is not suffered to remain without fresh additions, until the vintage is over. Whilst in France they will only suffer the pressure of one day's gathering to ferment together, the Italians will throw in fresh must in the height of the process. That wine so made, whatever may be the defects in cultivating the vine, could ever be of tolerable quality, is not to be expected. There are some landowners, however, who possess excellent wine, which they have been at considerable pains to manufacture, but then it is not to be drank beyond their own families, and has no connexion with what is commonly sold in the country with respect to quality.

Naples produces the best wines in this division of Europe, in consequence of the conformity which a volcanic soil bears to the cultivation of the vine. The Lacryma Christi is made here; it is an exceedingly rich wine, red, and with an exquisite flavour, and is supposed to be the Falernian juice celebrated by Horace. In Tuscany greater attention is given to the cultivation of the vine; and what is curious is, that the noblemen in Florence actually sell wine by retail from the cellars of their palaces. It is sold in flasks capable of holding three quarts. Very good wines are produced in Savoy and Piedmont; in Sardinia, where the fruit is so abundant, as that a portion of it is left on the vines from want of vessels to contain the juice; in Elba, where the quantity made is small, but of excellent quality and of the character of good port; in the Lipari Islands, and finally in Sicily.

In Hungary and Austria, the cultivation of vines is quite on a different footing. Of Hungarian wines, the species are counted to the number of thirty, of which the famous Tokay is one of the most distinguished. Tokay is the name of a town situated in the middle of the district where the vines which produce this wine grow. This district, extending about twenty miles, called the Submontine or Hegyalla, in High Hungary, is in the county of Zemplin. In this district the grape is large, and of a rich luscious taste. The grapes for this wine are the Hungarian Blue, when ripe called Trockenbeeren; being collected late in the season, and almost shrivelled up to raisins. They are carefully picked one by one. The species called *Formint* and *Hars levilii* furnish the prime Tokay, called Tokay Ausbruch. The vines are reared pollard fashion, and the vintage seldom takes place before the end of October. The Trockenbeeren are by that time over-ripe, and are carefully placed on a table grooved, from which the juice runs into earthen jars, and forms the rich "essence of Tokay," from their own pressure. This wine is like the syrups of the south of France, and is set aside by itself. The quantity made is small and very thick, and is considered most precious. The grapes are then trodden in a vat with the naked feet, and a small portion of wine essence is added to the must, which is allowed to stand twenty-four hours, and then set to ferment. This last is the famous Tokay wine, or Tokay Ausbruch, (*ausbruch*, or flowing forth of the syrup). It ferments for two or three days or more, during which it is stirred, and the matters which arise to the surface are skimmed off. It is then strained into casks. Tokay has a powerful aroma. It does not become bright for some time after it is in the cask. Tokay Ausbruch contains sixty-one parts of essence, and eighty-four of wine. The Maslas is a more diluted species of the Tokay, containing sixty-one parts of essence and a hundred and sixty-nine of wine. The best wine of Tokay has so peculiar a flavour of the aromatic kind, and is so luscious, that the taste is not easily forgotten. This wine sells in Vienna for twelve pounds sterling the dozen. The vineyard belongs to the Emperor and certain of the nobles; that called Tarcal produces the best. The side of the slope on which the vineyards lie, is about nine thousand yards long; but the choice portion, called Mezes-Male, is but six hundred, and is reserved, with its produce, for the Emperor and a few of the nobles.

Greece and Russia afford excellent wines, and in the former country, in the island of Cyprus, the method of making the article is the same as was practised in the best days of ancient Greece. In this island a practice is followed of burying a jar of wine on the birth of a child; this is dug up on the marriage of the individual, and is never sold. Wines of varied merits are not only made, but form a good article of exportation from most of the Greek islands; the Ionian islands are likewise the seat of vine cultivation. With respect to the share which Russia has in this sort of growth, the author informs us that its wines bear no comparison in quantity to the ardent spirit to which a coarse half-civilized people of the north may well be supposed to yield the preference. About twenty-eight millions of gallons of coarse brandy are every year distilled in that empire, besides a variety of other liquors, but, as may be inferred, little of this is of the product of the vine. In the southern parts of the empire the vine has of late years been cultivated with success, and as the territory of the Tzars is extended in this direction by force or fraud, the extent of wine produce will be yet more enlarged. That manufactured at present is chiefly made at Astracan and in the Crimea.

After discussing the pretensions of the various wines of Persia, and the East, of Africa, and the two Americas, Mr. Redding concludes the historical portions of his work, and adds two valuable chapters of a completely practical nature, and which are deeply deserving the attention of all families interested in the preservation of their wine. The making of wines is a theme developed by the author in a most interesting manner, and at the same time in a way so familiar as that the instructions conveyed by him cannot, by possibility, be misunderstood by even the most careless. He takes in, in his descriptions, ample views of the true principles on which the various processes should be founded—such as fermentations, the state of the wine in cellars, the choice of vines, the best method of cellaring the wine when chosen, the bottling of it, its preservation, mixing, strengthening, and amelioration. The last chapter presents a very elaborate account of the adulterations to which the juice of the grape, in all its multiplied forms, is exposed, and from the number of wines which are either manufactured under fictitious names, or are adulterated in this country, it may, with great propriety, be denominated an universal wine manufacture. We shall give a specimen of the tests by which the adulteration of commodities in general use, may be most easily detected.

"There are a variety of tests which may be applied to the more vulgar adulterations by those who do not understand chemistry. Sulphur will detect the presence of lead, turning the wine black or dark, if it be present; sulphurated hydrogen gas, acidulated by muriatic acid, will detect it in a moment. Alum is detected by equal quantities of lime-water and wine being mixed, and examined within sixteen hours, when if there be no alum, crystals will be found, easily separable by filtration; a muddy deposit will be seen if there be. The presence of colouring bodies is least injurious, and may be discovered by numerous tests, such as lime-water, if beet-root has been employed, acetate of lead, bilberries, elder, or log-wood. The best mode, where adulteration is suspected, is to apply to any chemist of tolerable skill, who can analyze the wine. According to M. Chevalier, the following are the best wine tests for the colouring matter:—potash, applied as a re-agent, to ascertain the natural colour of the wine; this it changes from red to bottle or brownish-green. The change of colour produced by this agent, it must be remarked, is different in the wine of different ages. No precipitation of the colouring matter takes place when potash is applied. Acetate of lead, lime-water, muriate of tin with ammonia, and with subacetate of lead, should not be employed, because incapable of producing uniform colours with wines of natural colour only. Ammonia may be employed, the change of colour it produces not perceptibly varying. It is the same with a solution of alum, to which potash has been added, which will answer the purpose."

There is no necessity, we should think, for us to express our opinion upon this book, as our estimate of its merits may be easily ascertained from the space which we have assigned to the notice of its contents. It is one of the most comprehensive, and perhaps, exact specimens of historical literature which we possess, and is remarkable for the spirit of impartiality which breathes over and gives life to a mass of curious information, the result of a diligence and industry which reflect the highest credit on the author.

ON THE VARIATIONS OF COLOUR IN PLANTS.

All plants, so long as they are withdrawn from the light of the sun, are of a pale yellow colour, and regain this same hue when, as in the instance of the endive and cardoon, they have been covered with earth and blanched. In this condition they are rich in oxydised juice, as their sweet taste and the tenderness of their parts show. Besides, these blanched plants give out nothing but carbonic acid, water, saccharine matter, and mucilage. As soon, however, as the light of the sun has called forth the proper activity of the plant, it empties its superfluous oxygen, and forms those partly resinous, partly oily substances which we find connected with the green colouring matter. The green colouring matter evinces its resinous nature by this circumstance, that it dissolves completely in spirits of wine; but as it is not deposited by water from its solution, but continuing mixed with it, gives out a very nauseous hepatic smell, it is likely that azota goes also to the composition of this green colouring matter. We shall only notice further, that a higher degree of vital activity in leaves, awakened by the light of the sun, often produces a blue colour from the green. In this case there is probably an excess of hydrogen above carbon, as the putrefactive fermentation of woad and indigo, which is encouraged for the production of the blue colour, seems to show. The blue colour of woad and indigo passes again, with mineral acids, into green, and lastly into yellow. Decayed and falling leaves are yellow and red, because the oxygen remains in them after the vital activity is gone.

ON THE FALL OF THE LEAF.

Why do the leaves fall in autumn? Why do old trees appear furrowed with cracks? These are questions which we conceive to be of considerable moment; and though we do not pretend to be able to resolve all the difficulties which they involve, we shall endeavour so far to raise the veil which conceals them from those who have not studied the subject.

It is the common opinion, we believe, that leaves fall because they are injured by the increasing cold, in consequence of which they wither, die, and fall from the tree; but this notion will at once appear ill-founded and erroneous, when it is recollected that the mere death of a leaf is not sufficient to cause its fall, for when branches are struck with lightning, killed by a bleak wind, or die through any similar cause, the dead leaves do not fall, but adhere as tenaciously to the dead branch, nay, sometimes more so, than when it was in full growth. In order to produce the natural fall of the leaf, it is indispensable that the tree continue healthy; and that cold is not the only cause, we infer from the fact, that some trees begin to lose their leaves as early as August, when the temperature is as high, and occasionally higher, than in July; while September, again, is usually as warm, at least as May, and in some seasons as warm as June. That cold accelerates the fall of leaves, however, we must admit, for a sharp night's frost, in October or the beginning of November, is certain to produce, on the ensuing day, most copious showers of leaves. M. Sprengel, one of the most eminent botanists in Europe, says he can find no other cause for the periodical change of the budding and falling of leaves, than the irritability of the plants, which, having been exposed for a a length of time to the stimulus of light and heat, is at length exhausted, as in all the higher organized beings, the vital activity acts periodically. External accidents, he adds, have indeed an influence upon these phenomena, but the weathering of the seasons cannot be the only cause of this change, since in hot-houses and green-houses we see that tropical plants, which enjoy the same heat and nourishment during the whole year, yet undergo this periodical change. We recollect, also, that Professor Thunberg mentions that European trees, grown in the southern hemisphere, cast their leaves at the approach of winter there, which is about the same period of the year that they put forth in their own climate.

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The Floricultural Magazine, and Miscellany of Gardening. No. I. Conductor, Robert Marnock. London: Simpkin and Co. 1836.

It is now very nearly three hundred years since the first attempt to teach botany, through the medium of books, was made. The period just mentioned, is the interval which has passed, since a learned physician of Tubingen published an introduction to botany. The number of works which have succeeded this in various countries, and intended to promote the same objects, are innumerable. Botany, however, as it now exists, may be said to be an entirely new science; for little, almost before our own day, was known of the anatomy and physiology of plants, and the true principles on which the arrangement of the vegetable kingdom should have been based, are altogether a modern discovery. What we understand by botany, then, in the present acceptation of that word, is not merely the power of distinguishing one plant from another, or associating with it certain medicinal virtues; it is far more comprehensive in its import, and implies a knowledge of the names and uses, the anatomy and physiology, and organization of plants individually; next of the general plan on which the vegetable kingdom is maintained, and of the laws in compliance with which they are developed, and placed in various situations, according to peculiarities of soil and climate; botany likewise includes a knowledge of the peculiarities resident in vegetable existence, which are capable of being so controlled by man, that he is able, by the exercise of his ingenuity and skill, to modify them, so as almost to alter their original nature. It is by no means a science for the idle philosopher in his closet; neither is it merely an amusing accomplishment, as some appear to think; on the contrary, its field is in the midst of meadows, and gardens, and forests, on the sides of mountains, and in the depths of mines—wherever vegetation still flourishes, or wherever it attests by its remains the existence of a former world. It is the science that converts the useless or noxious weed into the nutritious vegetable; which changes a bare volcanic rock, like Ascension, into a green and fertile island; and which enables the man of science, by the power it gives him of judging how far the productions of one climate are susceptible of cultivation in another, to guide the colonist in his enterprises, and to save him from those errors and losses into which all such persons unacquainted with botany are liable to fall. This science, finally, it is, which teaches the physician how to discover, in every region, the medicines that are best adapted for the maladies that prevail in it; and which, by furnishing him with a certain clue to the knowledge of the tribes in which particular properties are or are not to be found, renders him as much at ease, alone, and seemingly without resources, in a land of unknown herbs, as if he were in the midst of a magazine of drugs, in some civilized country.

That the acquisition of an adequate degree of a knowledge of botany, demands extensive labour and application, few will be disposed to doubt. The principles of the science are complicated enough to call for great soundness of judgment, and considerable accuracy of reasoning, whilst the facts which it embraces severely tax the best powers of the memory. These may be well described as the natural obstacles by which the way to botanical knowledge is embarrassed, but still would be deemed by most persons as trivial, when compared with the whole bulk of the impediments which is constituted by the addition of other difficulties, that may be called artificial. Here then we have a summary view of the ground which one, about to commence the study of botany, has presented before him. He contemplates, in the first place, the undisputed principles of the science as they are now established; he is then to consider those newer principles which have been introduced into the science, and which are to be received or rejected, according as the weight of evidence shall decide.

The object, therefore, of all expounders of this science should be to explain all those principles, to compare the evidence on which they are founded, to exhibit errors, and the causes of them, and in short, to place in the hands of the beginner in botany the best means whereby he can satisfy himself upon the all-important point as to that which is certain, and that which is doubtful. And when we consider upon what an extended examination this decision, in order to be a safe one, depends, we should heartily thank the skilful pioneers, who, by their diligence and skill, have saved us from the necessity of so gigantic a labour.

But the contemptible nature of botanical treatises in general, and the trifling information that is to be gleaned from them, has much damped the ardour of botanical study, and confined the knowledge of most persons, who are otherwise perhaps well informed, to a mere acquaintance with the visible beauties of a plant, leaving all that hidden world of harmony, and diversified combinations of simplicity, and wonderful ingenuity—the phenomena of vegetation—apparent to the more careful investigator of the extraordinary processes of nature in this department of her labours unnoticed, because unknown to him. A further reason for this ignorance may be found also in the general want of any physiological information in the various magazines which are connected with the science of botany; for we believe that there is no other than our own which goes deeper in this useful and beautiful science, than the mere name of the flower of which they give a drawing. Nor is the work before us any exception to the general rule in this matter; but is even more contemptible than the others in its illustrations; and as for its attempts at information in the other departments of botany, take the following sample.

"Seeing by advertisement in various gardening periodicals for the current month, your intention to commence the publication of a periodical, entitled '*The Floricultural Magazine*,' in wishing it the fullest possible success, I cannot refrain from offering a most sincere regret that the demand for such reading is not ten times greater than it is. Before offering a few remarks on the cultivation of that truly beautiful plant, Mimulus Cardinalis, I may first observe, that while few persons read more, none can derive greater delight and satisfaction in time spent in the cultivation of favourite flowers, and the reading of gardening Magazines, than myself. It is, therefore, with the view of hinting to you the necessity of exertion in discharging to the public the duties which you have undertaken, and to entreat those who wish to live happy, to turn their attention to gardening, that I now pen this article. I believe it is a fact generally admitted, that whenever opportunities are presented to an intelligent and reflective mind, it will remain but a short time indifferent to those delightful and instructive amusements connected with the cultivation of flowers. By attentively observing the progress of and daily growth of a favourite plant, we thereby induce and cultivate feelings of a highly exalted nature, which will as certainly, if steadily pursued, continue to rise in purity, as they will ultimately and permanently rest on the contemplation of that bountiful Providence, who in his goodness has thus provided us with so many beautiful objects, all of which are calculated to administer, not to our temporal wants only, but to those of the mind also, affording the most intense delight. To me it would, therefore, seem impossible that a rational mind could for one moment meditate on the splendid and endless variety displayed in the vast world of Nature, without feeling sensible emotions of gratitude to the God of Nature.

"I am, however, digressing from the object with which I set out, and now return to observe, that the following hints are thrown out, not for the information of those learned in the art of floriculture, but for persons circumstanced like myself, who, in the possession of a small greenhouse and a few perches of flower-garden, are, with such means, enabled to provide a never failing antidote to the mind, in preserving it from the contagious and feverish excitement of a busy world.

"Mimulus Cardinalis would appear to be a perennial herbaceous plant, requiring the protection of a cold frame during winter. I am told it rises to the height of two or three feet, with an erect, fleshy, tapering, branching stem, and opposite oval-pointed leaves on short, rather flat footsalks, and rich scarlet flowers. This, so far (with the exception of the flowers), is the appearance of my plant, which has grown in a mixture of yellow sandy loam, decayed leaves, and clear sand, there being just enough of the latter to prevent the earth in the pot becoming too much consolidated. I purchased a second plant, from which I have procured several young ones, in attending to the propagation of which I have been instructively amused. I first took off about two distinct joints from the top of the principal stem, and afterwards the ends of the lateral or side shoots. They were immediately inserted in a pot of loam, leaf mould, and sand, well mixed; and in less than ten days they had thrown out an abundance of roots, and were then removed into single pots; still being kept in a gentle bottom heat, in a hotbed frame, they soon grew to the height of several inches. To prevent their being weakened by this continued excitement, they were placed in a cool situation, where they gradually acquired strength, and now occupy a small bed in my flower garden; and I am happy in the anticipation of witnessing, during the autumnal months, a profusion of blossoms of this splendid plant. One of my plants cost 10*s.* 6*d.*, and the other 7*s.* 6*d*; but it may now be obtained in the country nurseries in this neighbourhood, and is no doubt common in many others. It is not yet too late, and may still be planted with success. I have lately been informed that good plants may be purchased at 2*s.* 6*d.* each."

ON THE CYPRESS TREE.

This tree is very proper to intermix with evergreens of a second size next to *Pines* and *Firs*, to form clumps; in which class it will keep pace with the trees of the same line, and be very handsome. Besides, the wood of this tree is very valuable, when grown to a size fit for planks, which it will do in as short a space as *Oaks*; therefore, why should not this tree be cultivated for that purpose, since there are many places in England where the soil is of a sandy or gravelly nature, and seldom produces any thing worth cultivating? Now, in such places these trees will thrive wonderfully, and greatly add to the pleasure of the owner while growing, and afterwards render as much profit to his successors, as perhaps the best plantation of *Oaks*; especially should the timber prove as good here as in the islands of the Archipelago, of which there is no reason to doubt. It was so gainful a commodity in the island of Candia, that the plantations were called *Dos Filiæ*, the felling of one of them being reckoned a daughter's portion.

The timber of this tree is said to resist the worm, moth, and all putrefaction, and is said to last many hundred years. The doors of St. Peter's church at Rome were framed of this material, which lasted from the great Constantine to Pope Eugenius IVth's time, which was eleven hundred years, and were then sound and entire, when the Pope would needs change them for gates of brass. The coffins were made of this material, in which Thucydides tells us the Athenians used to bury their heroes; and the mummy chests, brought with those condited bodies out of Egypt, are many of them of this material. This tree is by many learned authors recommended for the improvement of the air, and a specific for the lungs, as sending forth great quantities of aromatic and balsamic scents; wherefore, many of the ancient physicians of the Eastern countries used to send their patients, who were troubled with weak lungs, to the island of Candia, which at that time abounded with these trees, where, from the effects of the air alone, very few failed of a perfect cure.

The Cypress, among the ancients, was sacred to Pluto and Prosperine, and was used at funerals, especially of persons of fashion.

"Et non plebeios luctus testata
Cupressus."—LUCAN.

It was placed in front of the house, or in the vestibule, that no person who was to perform any sacred rites might enter a place polluted with a dead body; and the reason assigned for its use on this melancholy occasion was, that the Cypress, when once cut down, never springs up again. It would be an improper emblem, therefore, in a Christian country. The use of evergreens at funerals is yet not uncommon among us; but they are supposed to be significant of immortality, at the same time that their balsamic scent guards the attendants against the ill smells and infection that may be apprehended from a putrid body.

It was introduced into England more than 250 years ago, according to Turner, and is still found in old gardens. Evelyn praises it for its hardness; but it has never been planted in any considerable quantity among us, evidently because it cannot resist the attacks of our winter frosts and spring blasts. Its wood, having a pleasant smell, taking a fine polish, and not being liable to be eaten by insects, is esteemed for cabinet furniture and other similar purposes.

The common Cypress is propagated from seeds, which should be sown early in the spring on a bed of warm, dry, sandy earth, which must be levelled very smooth; then sow the seeds pretty thick, sifting the same light earth over them half an inch thick. If the weather should prove very warm and dry, it will be proper to shade the bed from the sun in the day-time, and water the bed, which must be done very carefully, observing not to wash the seeds out of the ground. In about two months time (if your seeds are good) the young plants will appear above ground, which must be constantly kept clean from weeds, and in very dry weather should be often refreshed with water; but this should be done with great caution, lest you beat these tender rooted plants out of the ground. If the seeds are sown upon a moderate hot-bed, and the bed covered with mats, they will come up much sooner, and with greater certainty, than when they are sown in cold ground.

In this bed the young plants may remain two years, by which time they will have strength enough to be transplanted into a nursery; but while the plants are young, they are tender, and should be covered in severe frost with mats to prevent their being injured thereby. The best season for removing them is in the beginning of April, when the drying easterly winds of March are over; and, if possible, choose a cloudy day, when it is inclinable to rain; and in taking them out of the seed-bed, preserve the roots as entire as possible, and, if you can, a ball of earth to each plant. Then draw the lines where the trees are to be planted at three feet asunder, and plant the trees at eighteen inches distance in the rows, observing to close the earth well to their roots, as also to lay a little mulch upon the surface of the ground about their stems; and water them well to settle the earth to their roots, which should be repeated twice a week, until the plants have taken fresh root.

These plants may remain in the nursery three or four years, according to the progress they make, or till your ground is ready where they are to be planted: but if you intend to let them remain longer, you should take up every other tree in the rows, and transplant out; for otherwise their roots will be matted together, so that it will render it difficult to transplant them, as also endanger the future growth of the trees. The plants should by no means be let stand too long in the nursery before they are transplanted out for good, because the roots do not mat together so closely as those of many other sorts of evergreen trees, whereby they may be taken up with good balls of earth to their roots; but the roots of the *Cypress* being apt to extend out in length, it is one of the most difficult trees to remove when grown large; therefore, most curious persons choose to plant the young plants into small pots, when they first take them out of the seed-bed, and so train them up in pots two or three years, until they are fit to plant out where they are to stand for good, and, by this management, they are secure of all the plants; for these may be shaken out of the pots at any time of the year without danger, and planted with their whole ball of earth, which is likewise a great advantage. When they are planted out for good (if they are designed for timber) they should be planted about twelve or fourteen feet distance every way, and in removing those in the full ground, be very careful not to shake the earth from their roots; to prevent which, you should open the ground about each tree, cutting off all long roots, then working under the ball of earth, cut the downright roots off; and after having pared off all the earth from the upper part of the ball, as also reduced the bulk of it, so that its weight may not be too great for the fibres to support, they may be carried upon a hand-barrow by two persons to the place where they are to be planted; but if they are to be carried to a distant place, they should either be put into baskets, or their roots closely matted up. When they are planted, the earth must be settled close to their roots as before, laying a little mulch upon the surface of the ground about their stems, to prevent the sun and wind from entering the earth to dry their fibres; and water them well, to settle the ground to their roots, which must also be repeated, if the weather proves dry, until they have taken root, after which time they will require little more care than to keep them clear from weeds.

The upright *Cypress*, which is the most common sort in England, seldom produces good seeds in this country; it is therefore the best way to have the cones brought over entire from the south parts of France and Italy, where they ripen perfectly well, and take the seeds out just before you sow them, for they will keep much better in the cones than if they are taken out. The method to get the seeds out is to expose the cones to a gentle heat, which will cause them to open, and easily emit their seeds.

They are capable, however, of being raised in a more expeditious manner, by sowing the seeds in pots or tubs of light earth, and plunging them in a moderate hot-bed; as in this way they will be fit for removing into nursery rows in the course of twelve months, or a little longer.

They may also be increased by cuttings made from the young shoots, planted in a warm sheltered situation, either in the early autumn or spring months, care being taken to have them daily supplied with water in the following summer. Afterwards the plants should be managed the same way as those raised from seeds. The plants raised from cuttings are much slower in their growth than those which are produced from seeds.

ON THE DISTRIBUTION OF PLANTS.

To find out the way in which plants are affected by their station, and the climate where they grow, to appreciate the peculiar circumstances which are essential to enable them to live and thrive within certain latitudes, are tasks which have imposed great difficulties on some of the cultivators of botany. This subject embraces a consideration of the constitution of the atmosphere and geological structure of all parts of the globe; and of the specific effects of particular conditions of climate and soil upon vegetation; all points upon which we can scarcely be said to know any thing. It involves the discussion of the plan upon which the world was originally clothed with verdure; and as Humboldt most truly observes, it is closely connected with the physical condition of the world in general. Upon the predominance of certain families of plants in particular districts depends the character of the country and the whole face of Nature. Abundance of grasses forming vast savannahs, or of palms or coniferæ, have produced most important effects upon the social state of the people, the nature of their manners, and the degree of development of the arts of industry.

If we examine the surface of the globe, we shall find its vegetation varying according to its inequalities and its differences of soil; we shall see that the plants of the valleys are not those of the mountains, nor those of the marsh like the vegetables of the river or of dry grounds; it will also be seen that the vegetation of all valleys, all mountains, marshes, or rivers, has a similar character in the same latitudes. The Flora of the granitic mountains of Spain and Portugal is very different from that of the calcareous mountains of the same kingdoms: in Switzerland, Teucrium montanum always indicates a calcareous soil; and the same may be said of certain Orchises, ustulata, and hircina, for instance in our own country. Hence it is inferred, that the differences in the character of vegetation, depend upon circumstances connected with the soil or atmosphere in which they grow.

The next, and by far the most important head under which the geographical distribution of plants is to be considered, is with reference to temperature and light. These depend, firstly, upon latitude; and secondly, upon elevation above the sea.

As we proceed from the pole towards the equator, we find the temperature gradually increasing; and as we ascend from the surface of the ocean up into the atmosphere, we find the temperature gradually decreasing, until we reach a point at which perpetual frost holds his throne, and where vegetation ceases.

In like manner we find, as we recede from the equator to the pole, we quit the country of palms and other arborescent monocotyledonous plants for the habitations of deciduous dicotyledonous trees, coniferæ, and cryptogamic plants; and that as we rise into the atmosphere as considerable a change takes place.

Therefore, in considering the matter of the vegetation of a given climate, it is necessary to take into account the temperature *peculiar to the latitude itself*, and the reduction *caused by elevation*.

It would seem, then, that the forms assumed by vegetation in different latitudes are dependent upon particular conditions of climate and soil, and that it is to variations of these conditions that we are to ascribe the difference between the Flora of the equator and of the polar regions. And this is no doubt true: but there are, nevertheless, some plants which have a remarkable power of adapting themselves to all climates and circumstances, and there are others which readily naturalise themselves in climates similar to their own. Of the latter, examples present themselves at every step; all the hardy plants of our gardens may in some sort be considered of this nature; for although they do not grow spontaneously in the fields, they flourish almost without care in our gardens. The pine apple has gradually extended itself eastward from America, through Africa into the Indian Archipelago; where it is now as common as if it were a plant indigenous to the soil; and, in like manner, the spices of the Indies have become naturalized on the coast of Africa and in the West Indian Islands. Of the former description the instances are not numerous, but they are very remarkable. In the woods of Georgia, in North America, grows the Rosa lævigata, which, while all the other species of rose of that country are entirely different from those of other regions, is identical with the R. sinica of China; to the Flora of which country, that of North America has no resemblance. Samolus valerandi is found all over the world, from the frozen north to the burning south; associated here with Amentaceæ and similar northern forms, and there mixed with palms and the genuine denizens of the tropics. Above 350 species are said to be common to Europe and North America, and even among the peculiar features of the Flora of New Holland, Mr. Brown recognised 166 European species The presence of many of such strangers may undoubtedly be referred to the agency of man, by whom they have been transported from climate to climate, along with corn and by other means; as, for example, at Port Juvenal, near Montpellier, the vicinity of which abounds with Barbary plants, the seeds of which are known to have been brought across the Mediterranean along with the Barbary wool, which is disembarked at that station. In like manner the various kinds of corn have been carried about from country to country for the service of mankind, until their real home has become doubtful. Medicago sativa abounds in Chili, whither it has been transported by the Spaniards; and instances in abundance of similar cases could be produced. But it must not thence be inferred, that all cases of species growing in places far away from their kindred forms, are to be referred to migration: for this, the agency of man, of animals, of seas, of wind, and of torrents, will doubtless have done a great deal; but none of the causes, nor any other with which we are acquainted, will explain the identity of the Calypso borealis, Orchis viridis, Betula nana of North America and of Europe; of the Potamogetons common to Europe and New Holland; of the Rosa, already adverted to, as common to North America and China; of the wide diffusion of Samolus valerandi, and, most especially, of the identity of the cryptogamic plants of various countries, plants incapable of cultivation, unconnected with the purposes of man, and, of all others, the most difficult of transport under any form. To us it appears that such plants must have been originally created in the places where they now exist; the contingent circumstances under which they are found having been favourable to the particular mode of vegetable development which was necessary for their formation. And this may be admitted as a circumstance connected with the original creation of the world, without having recourse to the theory of some philosophers, that nature exercises as this time the power of producing plants without parents; a subject upon which Professor Link remarks, that "we find buried in the earth the remains of plants which formerly existed, but which are now unknown." New forms have, therefore, been produced by nature different from the first. Wherever a salt spring breaks out at a distance from the sea, its vicinity immediately abounds with salt plants, although none gre[illegible]here before. When lakes are drained a new kind of vegetation springs up; thus when the Danish island of *Zealand* was drained, Vilny observed Carex cyperoides springing up, although that species is naturally not a native of Denmark, but native of the North of Germany. Hence it is easy to infer, that some plants have been produced at one time and others at another, some earlier and some later; and to this cause may be attributed the smaller number of species found upon islands than upon continents, the former having been produced the latest. Perhaps plants change from one to the other, as certain organic bodies when young belong to a less perfect class than when they are older. On the naked rocks we find Lichens, on the mud Confervæ, in ancient strata the remains of Monocotyledonous plants, in more recent strata those of Dicotyledons.

GERMINATION OF SEEDS.

The germination of seeds, or the phenomena which occur when the embryo contained in a seed is warmed into life, form a subject of deep wonder to the philosopher. The commencement of the change in the seed is marked by a general swelling of its body, which is caused by the water that is absorbed. This water is likewise the instrument of a chemical change in the juices of the seed, which is traced to the loss of carbon and the addition of oxygen. It is known that seeds will not germinate in the light, a circumstance which results from the decomposition by the light of the carbonic acid gas, which also expels the oxygen and fixes the carbon. The seed, under such circumstances, becomes hard, and this is a condition altogether inconsistent with vegetation. Reverting, then, to the process of germination, we shall find that when the chemical changes to which we have alluded are completed, the embryo also swells and bursts its envelope, protruding its radicle, says Mr. Lindley, "which pierces the earth, deriving its support at first from the cotyledons or albumen, but subsequently absorbing nutriment from the earth, and communicating it upwards to the young plant. The manner in which the embryo clears itself from its integuments differs in various species; sometimes it dilates equally in all directions, and bursts through its coat, which thus becomes ruptured in every direction; more frequently the radicle passes out at the hilum, or near it, or at a point apparently provided by nature for that purpose, as in Canna, Commelina, &c. If the radicle has a coleorhiza or rootsheath, this is soon perforated by the radicle contained within it, which passes through the extremity; as in grasses, and most monocotyledonous plants. The cotyledons either remain under ground, sending up their plumula from their centre, as the oak; or from the side of their elongated cauliculus, as monocotyledons; or they rise above the ground, acquire a green colour, and perform the ordinary functions of leaves, as in the radish and most plants. In the mangrove germination takes place in the pericardium before the seed falls from the tree; a long thread-like radicle is emitted, which elongates till it reaches the soft mud in which such trees usually grow, where it speedily strikes root, and separates from its parent. Trapa natans has two very unequal cotyledons; of these, the larger sends out a very long petiole, to the extremity of which are attached the radicle, the plumula, and the smaller cotyledon (Mirbel). Cyclamen germinates like a monocotyledon: its single cotyledon does not quit the seed till the end of germination; and its radicle thickens into a fleshy knob, which roots from its base (Mirbel). The Cuscuta, which has no cotyledons, strikes root downwards and lengthens upwards, clinging to anything near it, and performing all the functions of a plant without either leaves or green colour."

The conditions, then, which are indispensable to the germination of seed, are heat, moisture, and darkness; and if that be so, it is obvious that we have at once a clue to the best mode of managing seeds. Hence, in packing them, for travelling to a long distance, it is found, by experience, that no mode is so suitable for their conveyance as being packed loosely in coarse canvass bags, hung to the ceiling of the cabin of a ship; where they are exposed to light and air, and where they are protected from damp: this is much better than enveloping them in wax, or mixing them with sugar, as has been sometimes done: both pernicious practices. It has been thought, that if seeds were mixed with charcoal, as their carbon would, under such circumstances, always be in excess to their oxygen, their vegetation might be safely suspended. But it has not been found, from experience, that any practical advantage arises from this method; seeds perishing in charcoal as quickly as in most other media. The best material is the English coarse brown paper, made from old tarred rope, in which a large quantity of tar is incorporated. No material will preserve seeds so long a time as this; while cartridge paper offers them no protection whatever.

DESCRIPTION OF THE PLATES.

ONONIS NATRIX.

YELLOW-FLOWERED REST-HARROW.
Diadelphia Decandria.
Leguminosæ.

Gen. Char.—Calyx five-cleft, its divisions linear; vexillum striated; legume turgid, sessile; filaments in one undivided set.

Spec. Char.—Peduncle one-flowered awned, longer than the leaf; leaves ternate, viscid, oblong, toothed at end.

The Ononis Natrix, a plant usually to be met with in all general collections of greenhouse plants, is a native of Spain, and the South of France, where it is said to grow wild in the corn fields.

IRIS MARTINICENSIS.

MARTINICO IRIS.
Triandria Monogynia.
Irideæ.

Gen. Char.—Flower six-parted; every other division reflexed; stigmas shaped like petals.

Spec. Char.—Leaves linear.

This species is a native of the West India islands, and was introduced to the royal garden at Kew in 1782, by Mr. Alexander Anderson, from St. Lucia.

Is usually kept in the stove, plunged in the tan, where it flowers in May and June, and for the most part ripens its seeds, by which it is readily increased.

Is more remarkable for the curious structure than the beauty of its flowers.

ERICA MUCOSA.

ARBUTUS-FLOWERED HEATH.
Octandria Monogynia.
Ericeæ.

Gen. Char.—Calyx four-leaved; corolla four-fid; filament inserted into the receptacle; anther bifid; capsule four-celled.

Spec. Char.—Anthers bearded; leaves four; appendages subulate, pectinate, longer than the anther.

This very elegant and ornamental species grows to a considerable height, and in favourable situations produces abundance of flowers early in the summer, which are remarkable, though not peculiarly so, for being enveloped with a calyx of the same colour; is raised from seeds.

CAMPANULA MOLLIS.

SOFT BELL-FLOWER.
Pentandria Monogynia.
Campanulaceæ.

Gen. Char.—Corolla campanulate, closed at bottom, with staminiferous valves; stigma three-five cleft; capsule inferior, opening by lateral pores.

Spec. Char.—Leaves suborbiculate; capsule five-celled, pedunculate.

Though not a shewy plant, it is both rare and curious; seedling plants, when old enough to flower, throw out on all sides procumbent flowering stems, which die away after ripening the seeds, and are succeeded by others: as this process goes on, the stem, arising from the centre of the plant, slowly and gradually acquires a dwarfish height, and becomes shrubby. We have no doubt but, where the plant grows naturally wild, it must form a beautiful covering to the rocks on which it is found.

Being a native of countries much warmer than our own, it is necessary to make it a greenhouse plant; it will bear even the warmth of the stove, and flower and ripen its seeds the more freely for it. On a shelf, in the front of the stove at Chelsea, it flowers and seeds in spring, summer, and autumn; there in the pots it scatters its seeds, which produce spontaneously young plants in abundance; by seeds, indeed, the plant is easily raised—with difficulty in any other way.

DILLENIA SPECIOSA.

SHEWY DILLENIA.
Polyandria Polygynia.
Dilleniaceæ.

Gen. Char.—Calyx five-leaved; petals five; capsules many-seeded, connate, replete with pulp.

Spec. Char.—Leaves elliptic, oblong, simply serrated; peduncles one-flowered.

The present species has many years been cultivated at Kew, and in the stoves of the curious near town; is a native of Malabar and Java; in its native soil it becomes a vast tree: here we rarely see it more than two or three feet high; its flowers are large and shewy, but quickly deciduous, and remarkable for the unpleasantness of their scent, which is like that of the *Lycium Japonicum*, but not being readily exhaled, does not infect the air of the stove.

This species is increased without difficulty by ripened cuttings not deprived of their leaves, planted in a pot of sand, and plunged under a hand-glass in heat; these quickly produce flowering plants. They thrive best in a light loamy soil.

SAXIFRAGA MUTATA.

SAFFRON-COLOURED SAXIFRAGE.
Decandria Digynia.
Saxifrageæ.

Gen. Char.—Calyx five-parted; corolla five-petalled; capsule two-beaked, one-celled, many-seeded.

Spec. Char.—Radical leaves aggregate, lingulate; cauline racemose; calyx villose, viscid.

Linnæus has arranged several distinct species of Saxifrage under the *Saxifraga Cotyledon*, but very properly separates this; though in the general form of its foliage it is as nearly related to it as most of the others; from four of them it is indeed perfectly distinct, instead of the sawed cartilaginous edge, it has only fine soft hairs, more especially towards the base; towards the extremity there is some appearance of little teeth, but widely differing from those of the others. The whole plant is covered with viscid hairs; the stalk, about a foot high, is much branched; but the great peculiarity of this plant consists in its flowers, the petals being long, narrow, and pointed, and of a saffron colour, of a deeper tint when they first open, and gradually changing to a pale yellow; the beauty of the flowers is heightened by a glandular substance in the centre of each, which, when the flower expands, is of a bright purple colour.

This rare species of Saxifrage is a native of the Alps of Switzerland and Italy; the plant may also be produced from offsets, in the same way as the Saxifraga Cotyledon, vulgarly called *Pyramidal Sedum*, and requires a similar treatment; though an Alpine plant, it must be sheltered from much wet and severe frosts.

Baron Haller describes it with spots on the petals; those certainly do not exist on all plants.

SIDA CRISTATA.

CRESTED SIDA.
Monadelphia Polyandria.
Malvaceæ.

Gen. Char.—Calyx simple, angular; style many-parted; capsules several, one, or three-seeded.

Spec. Char.—Lower leaves cordate, about five-lobed, hastate; upper hastate; petals erect, spatulate, somewhat toothed at ends.

It flowered first in this country, in the garden of Mr. Sherard, at Eltham, in 1725, and was introduced from Mexico, where it is a native. Mr. Aiton considers it as a stove plant, as he does the *Tropæolum majus*, and other natives of South America; strictly speaking they may be such, but if raised early, and treated like other tender annuals, this plant will flower and ripen its seeds in the open ground.

It grows to the height of three feet, or more, producing, during the months of July and August, a number of blossoms in succession, which are large and shewy; the stigmata in the flower are curious objects, resembling the heads of fungi in miniature.

AMARYLLIS AUREA.

GOLDEN AMARYLLIS.
Hexandria Monogynia.
Amaryllideæ.

Gen. Char.—Flower nodding, irregular, funnel-shaped, ringent; filaments declinate, unequal in proportion or direction; seeds flat, numerous.

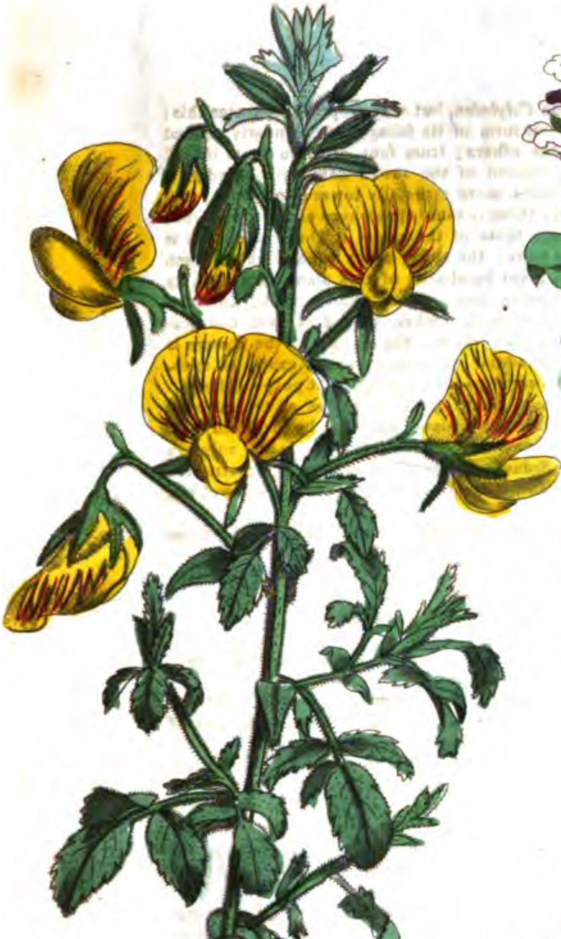
Spec. Char.—Flower stalked, erect; corolla in fundibuliform, elavate; sepals linear-lanceolate; stamens straight; leaves quite blue.

Mr. Aiton, in his *Hort. Kew.* informs us that this elegant species of Amaryllis was introduced from China, by John Fothergill, M.D. in 1777; that it is a stove plant, and flowers from August to September.

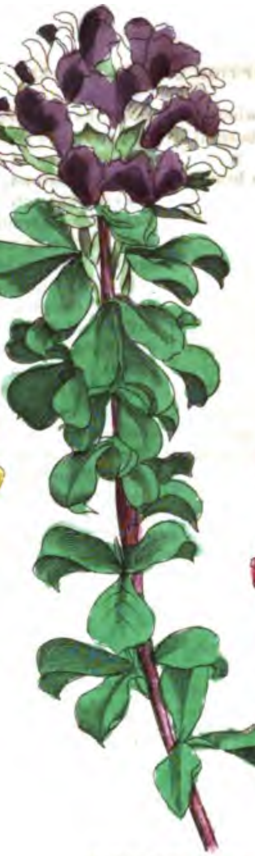
There are but few of the Chinese plants that require the heat of a stove; the present species would no doubt live in a good greenhouse, but the general practice confirms the propriety of giving it more heat, particularly when coming into blossom; the flowering indeed of many greenhouse plants, especially those of the bulbous and tuberous kinds, is greatly improved by a practice of this sort.

It grows to about the size of the *Amaryllis formosissima*, is characterised by the upright growth of its flowers, which are of a pale orange colour, having narrow and somewhat undulated segments, with a greenish keel; its style is very long, and its stigma bright red.

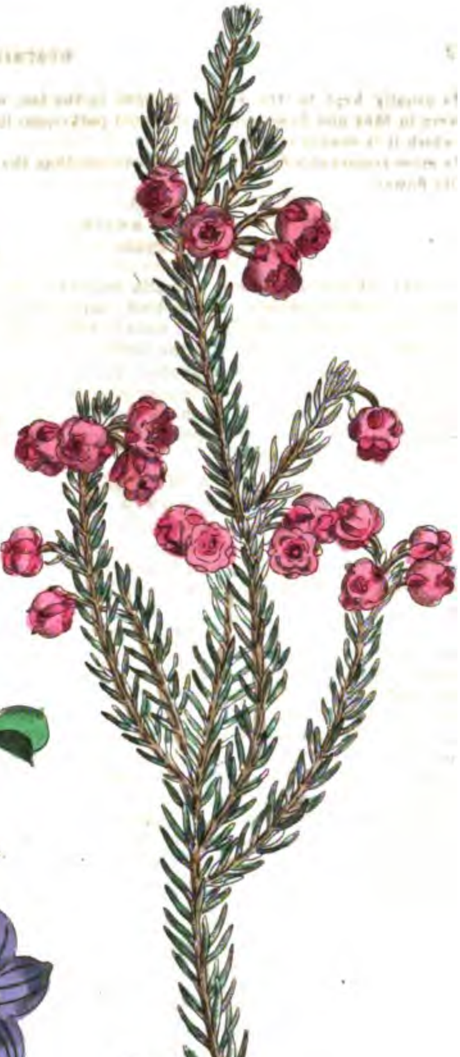
Like many other bulbs, it blows very irregulary, and is propagated by offsets, which are produced in tolerable abundance.



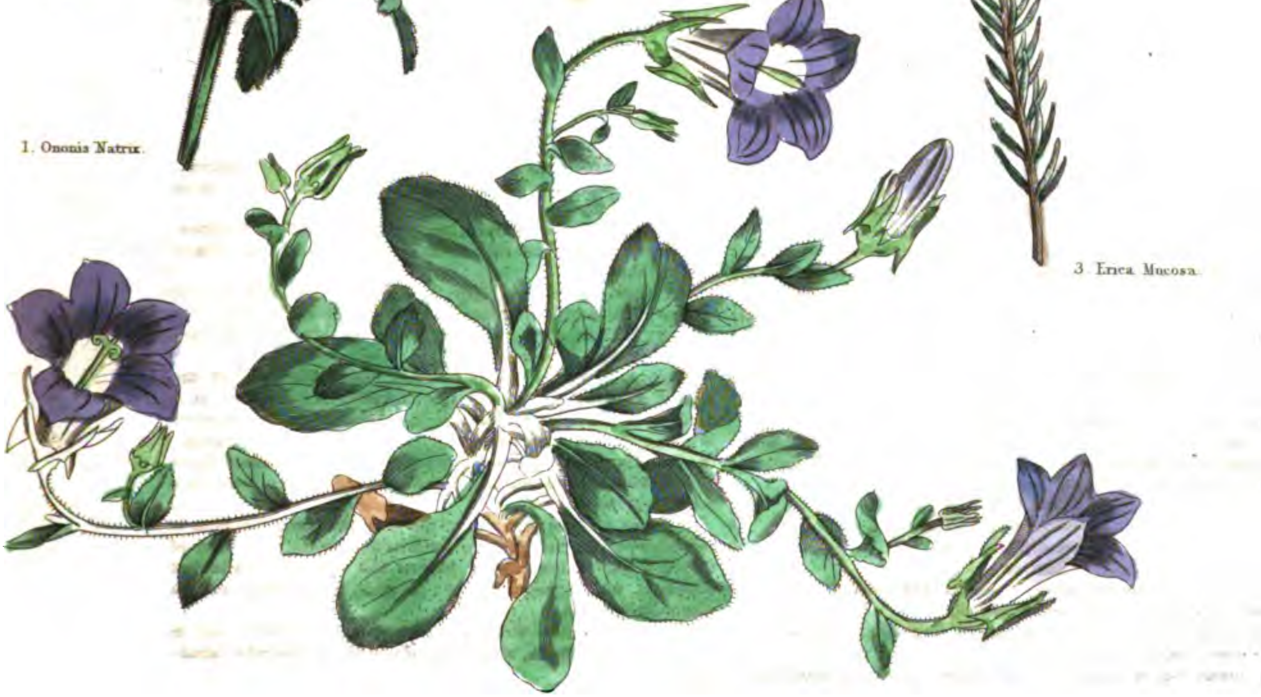
1. Ononis Natrix.



2. Iris Martinicensis.



3. Erica Mucosa.



4. Campanula Mollis.

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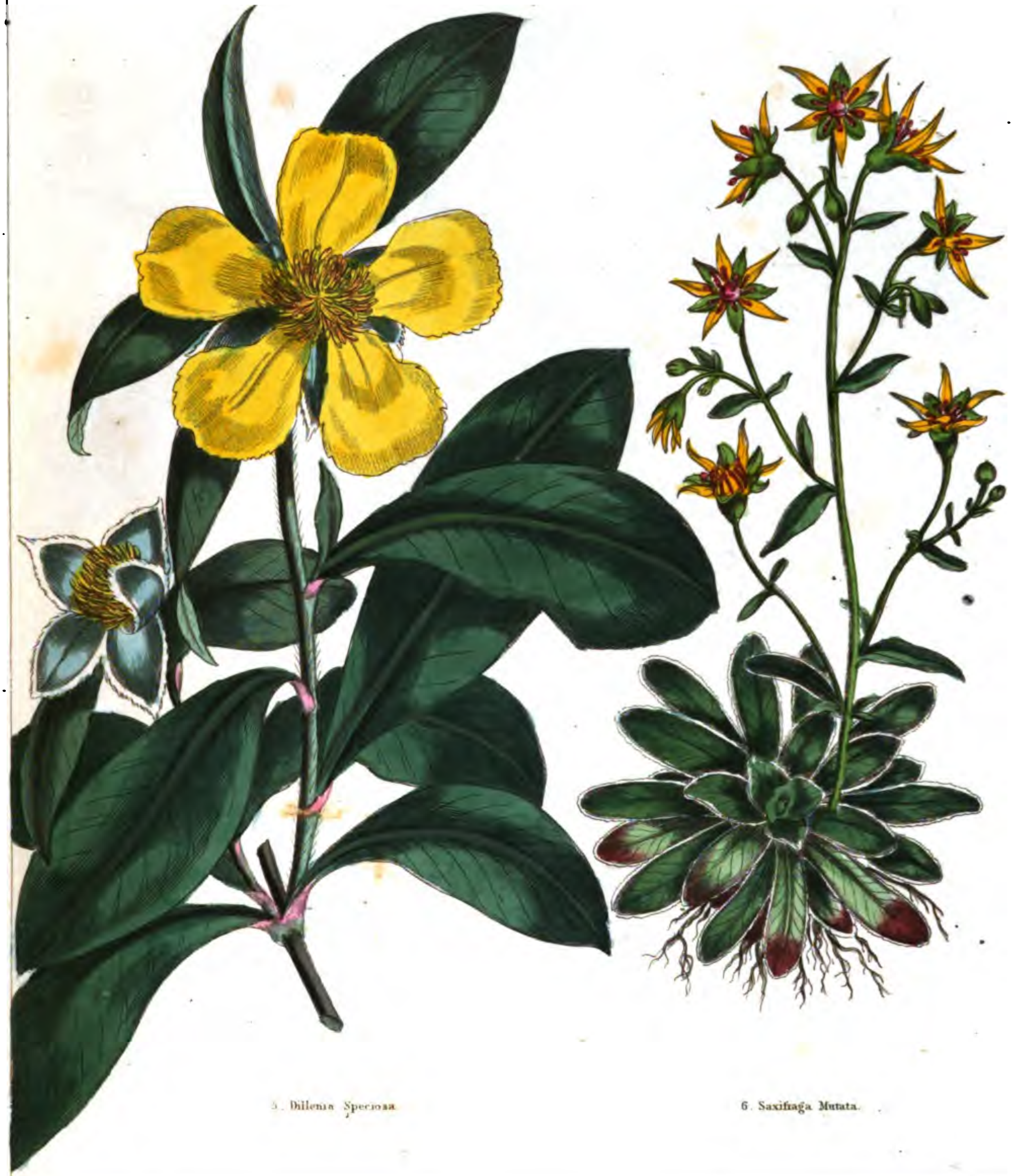
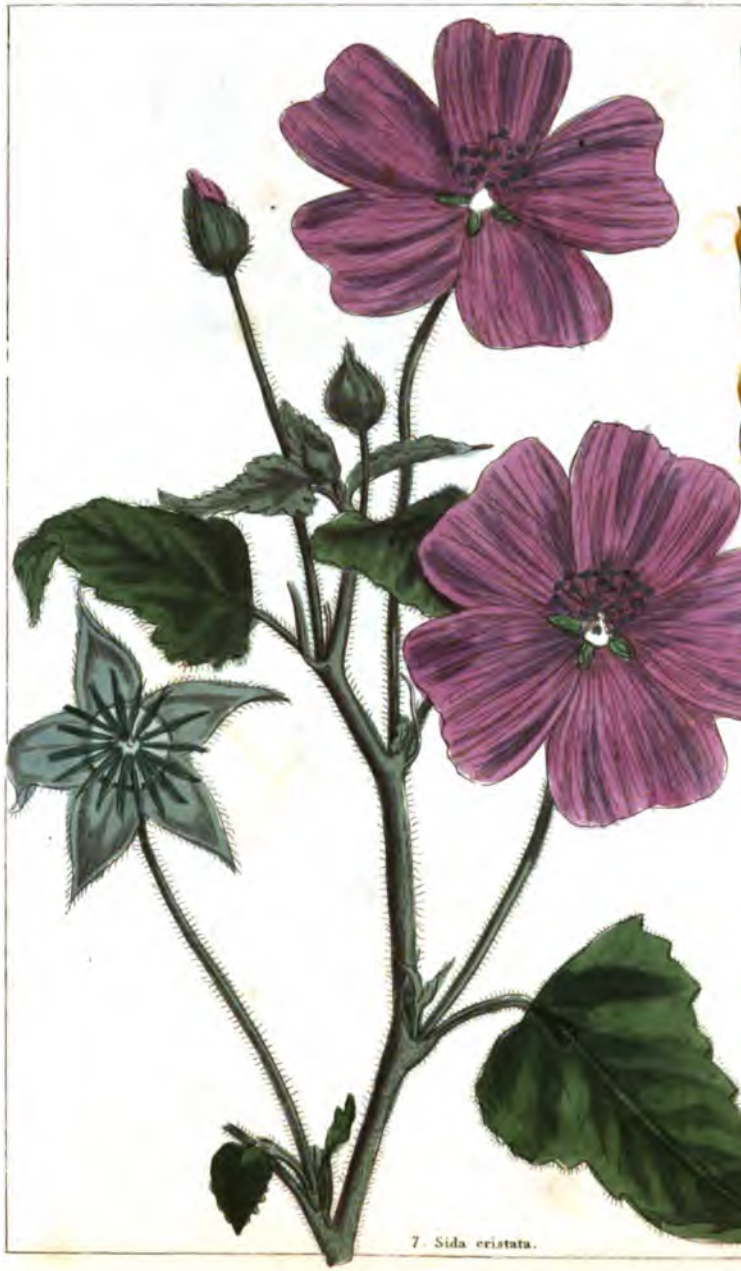
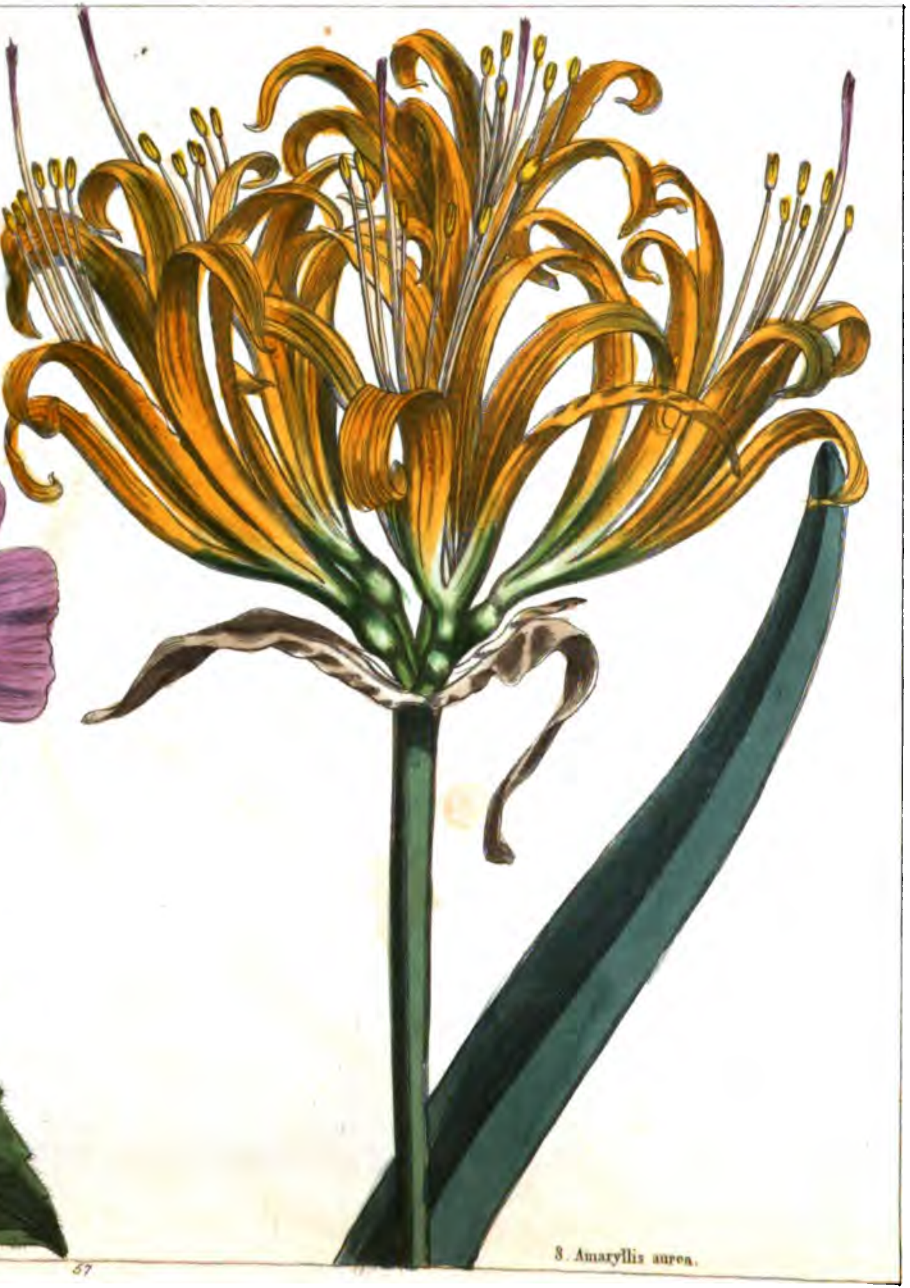


5 . Dillenia Speciosa.

6 . Saxifraga Mutata.



7. Sida cristata.



8. Amaryllis aurea.

THE
MAGAZINE OF BOTANY, GARDENING,
AND
AGRICULTURE,
BRITISH AND FOREIGN.

AUGUST, 1836.

MULBERRY PLANTATIONS AND SILK WORMS.

1. *Memoire de la Societe Royale d'Agriculture, Histoire Naturalle et Arts utiles de Lyon.* 8vo. Lyons.
2. *Memoires de la Societe Royale d'Agriculture et des Arts du Department de Seine et Ouse.* 8vo. Versailles.

From the records of the Agricultural Society at Lyons we gather some interesting intelligence respecting the subject of silk cultivation. It may be necessary to state, that this Society has devoted itself altogether to the great object of perfecting the growth of the silk-worm in the whole southern provinces of France; as, in fact, the comforts and the wealth of the inhabitants of those provinces are altogether connected with this branch of rural pursuits. It became, therefore, a matter of great consequence to this people to contemplate the extensive amount of rivalry with which their monopoly is now assailed, and to take such steps as will save their ancient trade from those infractions which the enterprise of other European nations are about to make upon it. The manufacture of silk is now established in Bavaria, and in Wurtemberg; in Prussia the planting of mulberries is conducted under the liberal encouragement of the government, upon a very extensive scale; mulberry plantations have also been laid down in Holland, as well as on the banks of the Wolga. Not only have the states northward of France, colonised, as it were, the materials of support for the silk-worms, but silk factories have been established in them which threaten the best produce of France, contending with them very firmly in the market. Indeed, not only do Switzerland, the north of Italy, and Austria, send silk goods to markets which were formerly supplied by France alone, but the provinces of the Rhine, and even manufacturers, as remote as the Russian dominions, bring silks to these markets. England has declared hostilities against the silk manufacture of France, in a manner so determined, that the French are quite apprehensive of the consequences, and her regulations for encouraging the growth of mulberries in her colonies, cannot fail to give an immense stimulus to the production of silk throughout her dominions. The climate of Jamaica, and that of the Indies, are so favourable for this purpose, as to be capable one day of being turned into silk stations as well as sugar and cotton colonies; and, no doubt, British ships will be employed in bringing home silk for consumption in Great Britain, just as now they are occupied in importing sugar and cotton. Anticipations like this, are now the subject of deep meditation in France, and they give rise to an anxious spirit which has led not only the government, but many local Societies connected with agriculture, to consider what opportunities for improving the cultivation and manufacture of silk remain to be made useful in that country.

Hence we find, that the great community of Frenchmen, whose interests are immediately or indirectly involved in this important branch of commerce, are bestirring themselves, and are devoted to the investigation of such questions as these: What are the conditions exactly, under which the cultivation of silk is at present carried on in France? Can improvements be introduced? What are the hopes of something being done, either by means of extending the production, and by its better management? These questions have been discussed at considerable length during the last few years in France; so that we may expect no small degree of light to have been thrown upon them by practical men. The Secretary of the Academy of Lyons, M. Grognier, has shown great learning and research in tracing the history of the silk manufactory from the era of the middle ages, principally with the view of exhibiting the principal changes of locality which this production underwent since that period.

In ancient times, silk-worms constituted a material of commerce peculiar altogether to the eastern world; it was not until the first century or two of the Christian era that they were brought even to Constantinople. The animals sustained the climate of the shores of the Bosphorus so well, that the cultivation of them spread over the Peloponessus, the surface of which, in a comparatively small interval of time, became covered with mulberry trees; the importance of which, in its connexion with silk works, may be judged of when we find that it led to the creation of a new name for the whole territory. From that epoch we find silk manufactures made, not only in India, China, and Persia, but also in Greece; and these were worn by the monarchy of the middle ages, and the chief persons about courts.

About the middle of the twelfth century, Roger II., King of Sicily, who had been a Norman prince, conquered some of the principal places in the Morea, in which he found numerous establishments for the manufacture of silk; and being a prudent ruler, he lost no time in transferring the manufacture to Palermo. The delay which occurred in the introduction of the silk-worm into Europe, was not owing to the want of mulberry trees, for they had been cultivated in it long before even the time of Justinian, but it was altogether because nothing was known of the worm, at least in reference to its weaving faculties. Being a native of the east, it naturally attracted the attention of the inhabitants of that portion of the world, who began by encouraging it in the formation of the silk, without having any notion of the use to which it was afterwards so happily converted. Authentic history shows that the Moors, during their domination in Spain, cultivated mulberry trees, and reared silk-worms, at an era when all the eastern silk came from Greece. The barons, on their return from the crusades, planted mulberries around their castles; and yet it would appear that no manufactures of silk were known in France before the reign of Louis XI. That monarch not only planted mulberries in his park at Plessis-les-Tours, but founded the great manufacture of Lyons, to which, as a central point, he united Italians from Florence and Lucca, expatriated at the period, in consequence of the sanguinary quarrels of the Guelphs and Gibbelines. The author of the treatise to which we are now directing the reader's attention, states that he took some pains to ascertain the facts which he states in respect of the early history of the French silk manufacture, and he found that the manufacture of silk in Lyons was solely the work of Louis XI., cruel and tyrannical as he had been, and not of Francis I., as is generally supposed. It was about four years after silk was worked in Lyons, that it was introduced into Tours.

Whilst the pursuit of the history of silk forms a subject of great attention in France, the consideration of the details of its cultivation has also been extensively discussed. No less a personage than the Prefect of the department of the Rhine, M. de Gasparin, has taken a great deal of pains to diffuse interesting information on the subject; and he shows, in a work of much value, the principal difficulties which will attend any attempt in France to extend the cultivation of silk beyond its present limits, in the southern portion of that country. This gentleman speaks from personal acquaintance with the practical agriculture of that part of France; and his observations, therefore, will prove the more worthy of attention.

Scientific men were formerly of opinion that the same climate which answered for breeding silk-worms, was also best fitted for mulberry trees, and that where the one did not grow, the other could not be cultivated. But this has only proved an unfounded theory, inasmuch as for ages, silk-worms, which formed the riches of one country, when brought to another where mulberries grew in perfection, were seen to fail altogether in the nature of the production. The white mulberry appears to thrive very well in the cold regions of Silesia; the black species, which will sustain the silk-worm, is indigenous to England, and to the whole of the north of Europe, as far as Upsal in Sweden; in these northern climates also, silk-worms have been reared, and a very fine silk manufactured from their silk. Thus is the position made out on undoubted evidence, that the natural limits of the cultivation of silk are not yet determined, and that there is no reason for believing that any obstacle exists to prevent the extension of this cultivation over the whole continent of Europe.

But, generally speaking, the cultivation of a particular article is not limited alone by boundaries which climate and temperature may raise against it; it is also subjected to those boundaries which economy places before it. As an example of the way in which this agent operates in practice, it may be mentioned, that up to Lyons the olive bears fruit, but beyond that, this tree is not cultivated, because its produce would no longer repay the expense of its cultivation. In truth, success in the attempt to produce vegetable food, will depend entirely on the amount of the population which may be made available to undertake its labours. Thus there are economical limits, as well as statistical limits, to the existence of a particular sort of cultivation in particular districts; and there are still other limits to it, which arise not from the want of population, but in consequence of the confirmed habits of the population in a totally distinct employment; and it is to this latter cause that most French writers attribute the want of cultivation of silk in the northern division of France. The various facts which have been collected in reference to this subject, furnish very intelligible grounds for explaining consequences which at first appear enveloped in mystery.

The establishment of silk cultivation in any given district must always depend, first, on the amount of the population, and next, upon the mode in which employment is distributed amongst them: every thing in this department, as in almost every other, is accomplished by human industry. Now, when the period arrives at which the silk-worm is about to discontinue its existence in the open air, it requires a greater degree of strength, so that a considerable addition to its nutrition is essential. In the south of France, this season occurs generally in May, when the whole of the other agricultural labours are suspended in the farms, and the labourers are all employed exclusively with the silk-worms. Farmers, their wives, children, and servants, are seen pulling the leaves of the mulberry, carrying and distributing them to the silk-worms; frequently even they are obliged to employ labourers from other districts to assist them in this work. Small proprietors, and a good number of labourers, are likewise employed in the cultivation of silk-worms. In the department of Vaucluse, the whole of the rural population is exclusively engaged, in the season of which we speak, with silk-worms. There is no doubt but the other departments of agriculture must suffer from neglect during this time, but very fortunately the season usually arrives when the fallowing is completed, and the mowing season scarcely ever begins until the silk-worm one is over.

In the district just mentioned, it is the custom to let the land lie idle every second year, and consequently, half of it is always out of cultivation. The object of this is to do away with a great portion of the expense of agricultural labour, since there is so large a share of it wholly devoted to the silk-worm. In those parts of the district where the practice of fallowing is abolished, where weeding and the formation of meadows offer so much new employment in the spring season, it is evident that the usual labourers will not have the activity necessary for supplying silk-worms. There is, therefore, an unavoidable necessity to call in strangers, which are a great source of expense, and the dread of which is very often the motive with farmers to give up silk-worm cultivation. At the season to which we have just been adverting, there is required for as many silk-worms as will produce one hundred kilogrammes weight of cocoons per day, a weight of mulberry leaves equal to two hundred kilogrammes. The French kilogramme is about two pounds three ounces of our avoirdupois. An average workman would gather all these leaves in a day; besides, there is a woman necessary to take care of every one fifty kilogrammes of cocoons, and the calculation is, that this season one hundred kilogrammes of cocoons require two-thirds of a whole day. It is, therefore, obvious, that the quantity of cocoons furnished by silkworms in a given place is limited by the condition of the rural population in the May season.

But there are other circumstances which materially influence the diffusion of silk-worm cultivation; such, for instance, as the nature of the tenure held by the proprietor of a mulberry farm. In all places where the silk cultivation is in a flourishing condition, it is found that there is a remarkably small division of property—that is, the farms are very contracted. This is the case in the mountainous parts of Milan, in Piedmont, Provence, Languedoc, and Dauphine. In fact, the same remarkable state of things exists in China and India. Thus, every holder of land in these parts has his own supply of mulberry leaves, and is consequently exempted from the necessity of making yearly advances in order to purchase the leaves. Besides, the establishments are in general on a small scale, which is a strong reason, as shown by experience, for expecting that they should succeed. In places where the farms are extensive, fresh difficulties to silk cultivation are found: individuals who are actually engaged in the cultivation, are persons merely hired by the proprietors, and will not give that attention and care to the business which would be afforded by those whose interests are directely involved in the success of the speculation. Again—under such circumstances, the cultivation is more precarious, inasmuch as one failure affects at once an extensive establishment of silk cultivation. Neither will any facilities be given to this cultivation by the system prevailing in France, in some parts where land belonging to townspeople are left to farmers as agents for their cultivation. In short, it is the deliberate conclusion of every rational mind, that the present state of the relations between the owners of the soil and the tenants in France, will not allow of any extension of the silk cultivation.

Here, therefore, the hopes of the French would have been finally lost, were it not that a penetrating countryman of theirs had succeeded in finding out a remedy. He discovered that, in some eastern countries, the mulberry was treated as we treat our corn—that is, it was sown as a yearly crop. An attempt to repeat this process has succeeded in the neighbourhood of Turin, and the French cultivators are delighted at the discovery, for it gets rid at once of all the obstacles which we have been describing to the progress of silk cultivation. The gentleman who, by his labours, has conferred this favour on his country, is M. Bonafous, who has added to the compliment by pointing out a species of the mulberry, which is a native of the

Philippine Islands, as fit for the French soil, and for the cultivation of this species, he has offered a handsome premium. His announcement of the prize is accompanied by an account of the advantages which the cultivation of it possesses; and amongst other recommendations belonging to it is this, that the leaves may be gathered by women and children, without any of that risk of personal danger which is so imminent at present in consequence of the height of the trees.

Not long since a large establishment was formed at a place called Senart, in the department of the Seine and Oise, for breeding silk-worms. The mulberry chosen for cultivation in this place is the white species, with large leaves; it was planted in a sandy soil, and was not put down to any great depth. In a half hectare of land in this place, five hundred dwarf plants are received. The hectare consists of a little more than two of our acres. In four years these plants yield from fifteen to twenty pounds each of leaves, so that it may be expected that in the sixth year a half hectare will yield about ten thousand pounds weight of these leaves, which will afford nutrition to as many silk-worms as will furnish a quantity of silk that will fetch about 850 francs. Upon the whole, the experiment has proved successful, and great hopes are entertained that its effects will be followed by important results in France.

From the consideration of silk cultivation in France, we turn to the efforts which have been made in our own dominions for the purpose of extending this cultivation. We have seen no adequate account of the proceedings which have been of late years pursued by our government in this department of its general duty, and it will be our task to give a summary of what has been accomplished by it in India, were it only to show how much may be effected by zeal and discretion.

It appears that two British merchants, trading to the East Indies, were induced, in the year 1827, to apply to the Bengal government to allow of experiments to be made for the purpose of trying an experiment in that Presidency in the cultivation of silk. The government agreed, and silk-worms, under proper superintendence, were sent to the prison of Ahmadnuggur. The example thus given was followed by several persons, and, amongst others, a Mr. Mutte, a native of Italy, eagerly entered into a speculation of the kind, in which he was materially assisted by the British merchants just mentioned. In the hope of improving the silk of Bombay, it was farther suggested, in the year 1831, by the merchants, that it would be advisable to obtain from Egypt, Italy, and St. Helena, both silk-worms' eggs and mulberry trees, for in those places the trees and the worms were of the best quality. It is proper to pause here, for the purpose of noticing that raw silk had been long made in Bengal. The silk-worm, however does not appear to be a native of India, and to have been transferred to Bengal from the northern provinces of China, as was the case with the worms brought to Europe. The domesticated silk-worms of Bengal are various, but all are inferior in the quality of their produce to the Chinese silk-worm. Attempts have been made to renew the breed in Bengal, by bringing eggs from China; but the worm has been found very rapidly to degenerate when retained for a short time in Bengal. This is a curious fact, particularly when taken in connexion with the well-known circumstance that in Italy, Spain, in the South of France, and in Constantinople, silks of the finest texture are made equal in quality to those of China. An experiment has been made in India with some of the best European breed of silk worms, but without success; whilst at St. Helena the best results were produced by a similar experiment. In this latter island four species of silk-worms are cultivated, one of which, having been transmitted from Piedmont, is superior to the rest. There has been also successfully grown at St. Helena, one of the best species of the mulberry, the large-leaved sort, well known to the Italians, and prized by them under the name of "Doppia." The foliage affords a great proportion of nourishment to the silk-worm. The success which attended the St. Helena experiments induced the government to send there for eggs and plants, and the same application was made to the Consul at Egypt (as we have already mentioned) in the same year, 1831.

The eggs and mulberries sent from St Helena were packed up in the following manner:—Portions of the eggs were attached to paper merely, and put into bottles, with muslin on the mouths; another series of eggs in bottles was buried in charcoal, and placed in a nailed box. The eggs which were obtained in Italy were carried out from Malta by the Earl of Clare; they were packed on the same plan. One paper of eggs was put into a phial, covered with a piece of muslin, and without a cork; the second was in a corked phial; the third in a phial with dry wood ashes; the fourth in a phial with dry sand; and the fifth in a phial with powdered charcoal: all the phials but the first were closely corked and placed in a box of powdered charcoal.

The St. Helena eggs arrived safe, and were immediately placed under the care of the Italian (Mr. Mutte) at Poonah. Those carried out by Lord Clare were nearly all spoiled, in consequence of his long detention at sea. The latter were procured by means of our Consul General (Mr Barker) at Alexandria, who had himself introduced the silk-worm and mulberry-seed from Piedmont into Egypt, and had also established their cultivation with great success on the banks of the Orontes, in a populous district near Antioch.

The experiment, so far as it has gone in India, appears to have been unattended with any very considerable success. A great deal of the imperfection of its silk manufacture is doubtless owing to the deficiency of mechanical power; and the objections to it on the part of the best judges in this country who examined the fabric, chiefly relates to the manner the cocoons were drawn into fibres, and not to the quality of the silk.

THE BALSAM OF MECCA TREE.

Balsamodendron opobalsamum (opobalsamum or Balsam of Mecca tree.) The *opobalsamum*, *balsam of Mecca*, and *balsam of Gilead* are supposed to be the produce of one and the same tree. Gerlach relates that the trees which produce the *opobalsamum* or *balsam of Mecca*, grow near Bederhunin, a village between Mecca and Medina, in a sandy rocky soil, confined to a small tract, about a mile in length. In the beginning of April, the trees drop their juice from gashes which are made in the smaller branches, into vessels set under them to receive it. A gash does not yield above three or four drops in a day, weighing about a drachm; nor will even the best trees yield more upon the whole in a season than from ten to fifteen drachms. The inhabitants use it as a sudorific, particularly in rheumatism: but it is adulterated upon the spot.

Lady Mary Wortley Montague informs us that the *balm of Mecca*, of the best quality, was not easy to be got in her time, even at Constantinople: that on applying some of it to her face, it became swelled and red during three days, but that her complexion was much *mended* by the operation: and that the ladies all used it at Constantinople, and have the loveliest bloom in the world.

Its great scarcity has prevented its coming into use among us; nor are its virtues, probably, superior to some of the resinous juices more common in the shops; all these substances being in their general qualities alike, though differing in the degree of their gratefulness, pungency, and warmth.

An inferior sort of balsam is prepared from boiling the young twigs and leaves gently in a large quantity of water; the balsamic matter rises to the surface, which is skimmed off. After they have thus procured all they can, it is said that they push the fire, and a large quantity of thicker balsam like turpentine rises, which is preserved by itself, and is that principally which we have in Europe. The other can only be obtained by presents; and that which distils naturally from the trees, scarcely supplying the seraglio and great officers, there is none of it sent out of the country.

Hasselquist describes the true *balsam of Mecca* as being yellow and pellucid, with a most fragrant resinous balsamic smell; as being very tenacious, and drawing out into long threads:

that it is taken from one to three grains, to strengthen a weak stomach, and that it is a most excellent remedy for wounds. To know whether it be adulterated, they drop some into a glass of water; if it remain still on the surface, it is of little value; but if it instantly extend itself over the whole surface, and may be taken off the water with a hair, silk, or thread, it is then of the best kind. The drugs used to adulterate this balsam, are oil of Sesamum, Cyprus turpentine, and ostrich fat.

Mr. Bruce has given two figures of the balsam tree; one of the whole tree, the other a single branch with the dissection of the fruit. These, he says, may be depended on, as being carefully drawn, after an exact examination, from two very fine trees brought from Beder Hunein. One of these was five feet two inches high from where the red root begins, or which was buried in the earth, to where it divides itself first into branches. The trunk at thickest was about five inches diameter, the wood light and open, and incapable of being polished, covered with a smooth bark of bluish white, like a standard cherry-tree in good health, which has not above half that diameter; indeed, a part of the bark is a reddish brown; it flattens at top like trees that are exposed to snow, blasts, or sea air, which gives it a stunted appearance. It is remarkable for a penury of leaves. The flowers are like those of the acacia tree, white and round, only that three hang upon three filaments or stalks, where the acacia has but one. Two of these flowers fall off and leave a single fruit: the branches that bear this are the shoots of the present year; they are of a reddish colour, and tougher than the old wood; it is these that are cut off and put into little faggots, and sent to Venice for the Theriaca, when bruised or drawn by fire; and formerly these made xylobalsamum.

The great value set upon this drug in the east remounts to very early ages. We know from Scripture that the Ishmaelites, or Arabian carriers and merchants, trafficking with Indian commodities to Egypt, brought with them balm as part of the cargo.

Strabo alone of all the ancients has given us a true account of the place of its origin. "Near to this," he says, "is the most happy land of the Sabeans, and they are a very great people. Among these frankincense, myrrh, and cinnamon grow, and in the coast that is about Saba, the balsam also." Among the myrrh trees behind Azab, all along the coast to the Straits of Babelmandeb is its native country. It grows to a tree above fourteen feet high, spontaneously and without culture, like the myrrh, the coffee, and frankincense tree; they are all equally the wood of the country, and are occasionally cut down and used for fuel. We need not doubt that it was early transplanted into Arabia, that is into the south part of Arabia Felix, immediately fronting Azab: the high country of Arabia was too cold for it, being all mountainous, and water freezing there. The first plantation that succeeded seems to have been at Petra, the ancient metropolis of Arabia, now called Beder or Beder Hunein.

Afterwards, being transplanted into Palestine, it obtained the name of *balsamum judaicum*, and balm of Gilead, and became an article of commerce there.

There were three productions from this tree very much esteemed among the ancients. The first was called *opobalsamum* or juice of the balsam, which was of the finest kind, composed of that greenish liquor found in the kernel of the fruit; the next was *carprobalsamum*, made by the expression of the fruit when in maturity; the third was *xylobalsamum*, the worst of all; it was an expression or decoction of the small new twigs of a reddish colour. But the principal quantity of balsam in all times was produced by infusion, as at this day. The wound is made by an axe, when the juice is in its strongest circulation, in July, August, and the beginning of September. It is then received into a small earthen bottle, and every day's produce is poured into a larger, which is kept closely corked.

Some books speak of a white sort, brought by the caravans from Mecca, and others of a balsam of Judea; but these are counterfeits and adulterations. The balsam of Judea was lost long ago, but as late as Galen's time, it was growing in many places of Palestine besides Jericho.

When Sultan Selim conquered Egypt and Arabia in 1516, three pounds was then the tribute ordered to be sent to Constantinople yearly; and this was till lately kept up. The remainder is sold or farmed out to some merchants, who, to increase the quantity, adulterate it with oil of olives and wax, and several other mixtures, consulting only the agreement of colour; formerly we are told it was done with art, but nothing is easier detected than this fraud now.

It does not appear that the ancients had ever seen this plant, they describe it so variously; and Prosper Alpinus corroborates the errors of the ancients, by saying it is a kind of vine (viticosus). The figure he has given is a very bad one.

The juice, when first received into the bottle, from the wound, is of a light yellow colour, apparently turbid, in which there is a whitish cast, which I apprehend arises from the globules of air that pervade the whole in its first state of fermentation: it then appears very light upon shaking. As it settles and cools, it turns clear, and loses that milkiness. It then has the colour of honey, and appears more fixed and heavy than at first. After being kept some years, it becomes of a much deeper yellow, and of the colour of gold, but continues perfectly fluid, and loses very little of taste, smell, or weight. The smell at first is violent and strongly pungent, like that of volatile salts. In its pure and fresh state it dissolves easily in water. If dropt on a woollen cloth, it will wash out easily and leave no stain. It is of an acrid, rough, pungent taste, is used by the Arabs in all complaints of the stomach and bowels, is reckoned a powerful antiseptic, and of use in preventing any infection of the plague. These qualities it enjoys probably in common with balsam of Tolu, Peru, &c. which we have received from America. It is always used and particularly esteemed by the ladies as a cosmetic; as such it has kept up its reputation in the east till this day. The manner of applying it is this: you first got into the tepid bath till the pores are sufficiently opened, you then anoint yourself with a small quantity, and as much as the vessels will absorb; never-fading youth and beauty are said to be the consequences.

EVERGREENS.

EVERGREENS are altogether a very curious part of the economy of nature, and they somewhat perplex those physiologists that make plants the mere creatures of a given temperature. The surface from which the leaf of a laurel, or the spine of a fir, falls in May or June, when the young shoots and tender leaves have come into vigour, and the plant is in the state of greatest activity, is no more a wound than that from which the leaf of the mulberry is separated by the very first frost of the season, or the leaf of the apple and the peach is dropped at a more advanced stage of the cold. The leaf of the deciduous tree falls when the annual action of the tree ceases, and that of the evergreen when the plant is in the full height of vegetation; and each of them equally cicatrizes the wound by a coating of natural varnish. From the differences in the circumstances under which those two analogous operations are performed, we must infer that there is a difference in the mode of operation; and that, though a certain state of the air and the matter with which the air is loaded, be necessary to bring about the fall of the leaf, whether in the cold season or in the warm, it is always accompanied by some particular action in the plant, the nature of which is not well understood. Some say that the cold reduces the little stratum of gluten which lies between the deciduous leaf and the plant to a solid consistency, by which means the vessels of the leaf are strangulated, and the circulation ceases. But that, like many other things that have been said in natural history, may be only putting the effect forward as the cause; and, at all events, it does not explain why the leaves of evergreens fall only in the warm months, when the plants are active. There is another difficulty about the matter. There are some leaves that do not fall, though they certainly die, until they are, as we commonly say of the leaves of the evergreens, forced off by the young ones of the next season. The beech is a familiar instance of this; and it is only so while it is young and deserves the name of a bush, rather than that of a tree. Though the leaves turn to that russet, which with the untorn form of the leaves, and their firm texture, makes the young beech a sheltering and far from an unhandsome tree in the inclement season, they resist the wind, and are as difficult to pull as if they were alive. There is, however, no vegetable action in them, nothing that can be killed, as is the case with the leaves of the evergreens, many of which are in whole, or in part, withered by the frost; so that, in the case of the leaves of the beech, we have the suspension of the action and circulation, without any of that tendency to separate, which is said to be anterior to the suspending of the circulation, and the cause of it. The safest way, therefore, is to conclude that the fall of the leaf in any particular plant, is not the particular action of any single external cause, such as a particular temperature upon the junction, but an action of the whole plant. Yet in the whole plant it may be modified by other circumstances. The beech that wears the russet livery of winter, and that through the bare twigs of which the wind howls, are not different varieties; for any one who has the opportunity of examining beech woods, may find the aged tree quite bare, and the sucklings around the root clad in their hard and lifeless foliage. And even those lateral branches that form upon the trunk of the beech by the accumulation of a ganglion in a cell of the bark, at the termination of one of the radiating plates or filaments that extend from the centre of the tree, may be seen with its leaves on, after the greater part of the head has been denuded. The formation of those woody ganglions is, in itself, a curious matter. They are peculiar to trees that have well defined radiations, though they are not found upon all of these; and they are never found upon trees the wood of which has only concentric rings, such as the pine. There is a medullary thread from the pith of the tree to the ganglion; and the latter, even when not the size of a small pea, is hard and fibrous, the fibres being wound round centres from which the future branches are to issue. Though covered by the epidermis and external bark of the tree, those little knobs are surrounded by a liber of their own, at every point, except that by which they are attached to the medullary thread. Wood of this kind is always much more easily split upon a radius than in any direction, and that which wants the rays is always most easily split in the lines of the concentric rays. By dexterous management, a portion of young pine may be divided into a series of tubes like those of a pocket telescope, and there are always some parts in which the division can be made with the greatest facility; but whether those be the production of warm summers or protracted winters, has not been determined. That the rings in pines do register the qualities of the seasons, there is not the least doubt; and some very useful conclusions might be drawn from a careful comparison of them with observations made at the places where they grow.

That, however, is a work of time, and so are many of the desiderata that have to be supplied before we can settle the question as to why of two plants, that are in many respects like each other, the one should shed its leaves, and the other be an evergreen. The fruit, as well as the leaves, of the evergreens, at least the greater part of them, appear to have the same power of resisting the cold as the leaves; and the boles of them are also less liable to be covered with parasitical plants. All vegetable substances, indeed, when they are in a state of decay, are apt to become covered with other vegetable substances, and the dead bark of pines, when exposed to damp, is encrusted with lichens; but they are by no means so common as on deciduous trees. There is very rarely moss upon a yew or a juniper, in those situations where the latter plant will thrive.

Though we cannot completely understand the physiology of that part of the vegetable kingdom, we can see some important uses of evergreens in the general economy of nature. As has been said, they lessen the violence of the winds which, when the herbaceous plants have died down, would sweep the most valuable parts of the soil into the beds of the streams; and they afford both shelter and food to the birds. The berries of the holly, and, after they are gone, those of the ivy, preserve a very great number of the feathered tribes, in those early times of the year when the eggs of insects are not hatched, and the slugs and shell-snails have not come out of their hiding places; and even in the deepest storms, the little tenants of the woods may be seen under the pine branches that are loaded with snow, hopping from twig to twig, and dexterously raising the scales of the cones so as to get at the seeds.

INFLUENCE OF LIGHT IN EFFECTING THE COLOUR OF PLANTS.

A SEAWEED, growing at the bottom of the ocean at a depth of 200 feet, when taken out, had its vine-shaped leaves as green as those of our gramineæ. According to Bougner's experiments, light is weakened after a passage of 192 feet, in the proportion of 1 to 1477·8. At the depth of 200, this fucus could only have had light equal to half of that supplied by a candle seen at the distance of a foot. The germs of several of the liliaceæ, the embryo of the mallows and other families, the branches of some subterranean plants, and vegetables transported into mines in which the air contains hydrogen or a great quantity of azote, become green without light. From these facts one might be induced to think that the existence of carburet of iron, which gives the green colour to the parenchyma of plants, is not dependent upon the presence of the solar rays only. Turner and many other botanists are of opinion that most of the seaweeds which we find floating on the ocean, and which in certain parts of the Atlantic present the appearance of a vast inundated meadow, grow originally at the bottom of the sea, and are torn off by the waves. If this opinion be correct, the family of marine algæ presents great difficulties to those physiologists who persist in thinking that, in all cases, the absence of light must produce blanching.

CLEMATIS VIRGINIANA.

THE stems are woody, more so than those of any other species, angular, climbing to the height of twenty or thirty feet or upwards, and hanging down from rocky cliffs, ruins, or the branches of trees; or being supported by, and forming tufts on, the upper surface of other shrubs, or low trees, which they often so completely cover as to have the appearance of bushes at a distance. The footstalks of the leaves are twined about whatever object they approach, and afterwards become hard and persistent, like the tendrils of a vine. The leaves are either quite entire, or unequally cut; sometimes very coarsely so. The panicles are axillary and terminal, many-flowered, and downy. The flowers are of a greenish-white colour, with little show; but they have a sweet almond-like scent. The seeds have long, wavy, feathery, and silky tails, forming beautiful tufts, most conspicuous in wet weather.

CLEMATIS FLAMMULA.

A VIGOROUS growing plant, the stems of which attain the length of ten feet or fifteen feet in a wild state, and from fifteen feet to thirty feet in a state of culture. The leaves of the entire plant are subject to much variation, from soil, situation, and climate. The shoots of a well-established plant, which has been cut down, grow with great rapidity in the early part of the season, attaching themselves to whatever is near them. The peduncles of the flowers are sometimes simple and sometimes branched. The colour of the sepals is white, slightly pubescent on their exterior margins. The whole plant has a dark green hue; and in autumn it is abundantly covered with flowers, the odour of which is of a honeyed sweetness, exceedingly disagreeable to some persons when near, though at a distance it is not unlike the fragrance of the common hawthorn. The number of the styles varies from five to eight.

AGRICULTURAL COLONIES.

One of the most extraordinary anomalies connected with the state of all countries, is the existence of so many paupers who are distressed for food, and at the same time, of quantities of land capable of producing twenty times the quantity of food that would suffice for the support of those paupers. In France' the estimate is, that two millions are the amount of the perpetually hungry poor, while nearly the seventh part of the area of that kingdom is left sterile. It has been determined by experiment, that land thus abandoned may be rendered productive, and those who have made the discovery, actually took steps to demonstrate its truth. This will explain the origin of agricultural colonies, such as have existed some time in Holland. How the principle was introduced into that country, has been long a question of doubt, but it is now no longer a mystery. It appears, that a Dutch general of the name of Van Den Bosch, being on duty in the Island of Java, obtained from a mandarin in that place, the knowledge that he (the mandarin) had under his superintendance, a colony of Chinese, and that they were employed upon land in a way, which though most farmers would despise it, yet was it far from really meriting to be an object of contempt. In fact, the Chinese were employed in the careful preparation of manures, the most remarkable feature in Chinese husbandry. When General Van Den Bosch returned to his native country, he laid before the king a plan for establishing pauper colonies on uncultivated land. The effect surpassed expectation; and for a more particular account of the success attending the execution of the plan, we refer to Mr. Jacob's Report on the Corn Laws.

Within ten years, a vast territory had for the first time been cultivated. Society found, in this revolution, new guaranties of tranquillity; the public treasure, a new source of revenue, and a still greater of economy; because, in fact, the child and the beggar cost less in the pauper colony than in the asylum; and government acquired the right of getting rid for ever of the trouble of paying for them, by furnishing for sixteen years, a stipulated sum, but less than that which it had paid formerly.

THE CACAO.

The history of the cultivation of the cacao, or chocolate tree, forms a source of very great entertainment to the botanist. Its scientific name, theobroma, signifies *food for the gods;* and it appears to be native alone to the tropical regions of America. It was not till the fifteenth century, that any thing was known of it to any of the rest of the world besides. The seeds of this plant have been from time immemorial employed in Mexico as a small coin; and there too, cacao plantations are principally settled by persons in a humble condition, who thus "prepare for themselves and their children, a slow but certain fortune." A single slave is sufficient to aid them in their labours. They clear the soil with their own hands, raise the young cacao plants beneath the shade of the erythrina, or the banana, prune the trees, destroy the swarms of worms and insects that attack the bark, the leaves, and the flowers; dig trenches, and submit to lead a life of privation for the space of seven or eight years, until the cacao trees begin to bear fruit. Thirty thousand trees assure competence to a family for a generation and a half.

The only colonies belonging to England in which the cacao is cultivated, are Trinidad, Grenada, and St. Lucia, and there it was discouraged by the impost laid on chocolate imported into this country.

The plant, as is the case with coffee, requires the companionship of other trees, such as the plantain, the coral bean, &c. The fruit is of a cucumber shape, but is much thicker; its colour, when on the tree, is green, but changes, as it ripens, to a bluish red, approaching to purple, with pink veins. The cacao of commerce is composed of the seeds contained in the pod of the cacao. This species, like the rest of the plants used as food, is subject to attack from insects. The best cacao seeds come from Soconusco, Maracaibo, and Magdalena.

The preparation from cacao most used in Europe, is that called chocolate, a word which we borrowed from the Mexicans, but which we use in a sense quite different from that in which they employed it. In Mexico the first combination of chocolate with various spices was made, and so inviting was the liquid solution of it, that it was habitually served to the creole ladies in the church, even during the time of divine service, by their slaves. In making chocolate, which is an employment followed in numerous places of Europe, the cacao is picked with the greatest nicety; it is then dried, just as the coffee bean is; the husks and germ of the seeds are next removed, and the pure kernels again submitted to the action of fire. In Italy, the cacao is burned to blackness; in Spain, it is carried a little beyond the degree which will dry the seeds; whilst, in England and France, a medium temperature is adopted. The aromatic substances mixed with cacao to form chocolate, consist of vanilla and cinnamon, as in France, and of vanilla alone, as in England. The husks of cacao are used as food by the poor of Switzerland, and have lately been introduced as such into Ireland.

Vanilla, used by us as an ingredient in chocolate, is a native of Mexico; its seeds are used and are sold in pods, which contain, with the seeds, a black, oily, and balsamic substance.

ON MILLET.

The grain called millet, has this advantage peculiar to it, that it is capable of being successfully cultivated in arid soils, and under such a degree of the sun's influence, as scarcely any other valuable plant could endure. It has been the chief food in Syria from time immemorial; it is cultivated in several parts of Arabia; in India, in the sandy deserts, in the dry regions of Cochin China, and in Nubia, no other grain is produced; in the latter place, as well as in Egypt, it is called dhourra. The great Indian millet (holcus sorghum) is the one which we have spoken of; but, independently of this, there is another, the common millet, which is grown in Europe, but not for human food. In England, we use a millet-seed (holcus sorghum saccharatus) for puddings; this variety is a native of India, and is extensively cultivated in China.

ON SAGO.

Sago is the pith of a tree growing in the Eastern Archipelago. This pith affords the farina, which forms the bread of the Moluccas. The most proper period for extracting the pith, varies according to circumstances connected with the nature of the soil on which it is grown, age of the tree, &c.: it is commonly taken, as occasion requires, in any of six stages of the progress of the medullary substance. But the surest test, as practised in the Moluccas, is to ascertain the state of the pith by actual experiment: this is done by boring a hole through the stem, extracting a piece of the pith, and examining its degree of matureness. When it is pronounced to have arrived at the most favourable condition, the trunk is felled down close to the root. It is then cut transversely into pieces of about six or seven feet in length; these are split into two parts, disclosing the medullary substance with which they are filled; and which is scooped out and beaten into a coarse powder resembling saw-dust, by means of an instrument made of bamboo, or some hard wood. In this state it is put into a trough, and mixed with water, and when in combination, the mixture is strained through a sieve fixed at one end of the trough, by which means the fibrous parts remain behind, and the water, charged with the farina, passes through into a second vessel, where it is left for subsidence. The farinaceous matter falls to the bottom, and the supernatant water is drawn off. It must then be subjected once or twice more to the same process, when it will be sufficiently purified and fit for use.

The sago of commerce is in the form of coriander seeds, but this granular appearance is given artificially, by making the finest sago meal into a thick paste with water.

ARROW ROOT.

Arrow root is a native of South America, and is now much cultivated in the West Indies for commerce. When the roots are a year old, they are fit to be employed in the production of this well known powder. They are cleaned, and then grated into a pulp in wooden mortars. In this state the pulp is put into clear water, and intimately mixed with the fluid. The farinaceous parts are thus washed off into the water, while the fibrous portion is separated. This is collected together, and when the moisture is pressed from it, is thrown aside. The white turbid fluid which remains is left for subsidence, after being strained through a hair seive in order entirely to free it from all fibrous particles. The supernatant liquor is then drawn off, leaving the starchy matter in a pasty mass at the bottom. Fresh water is added to this; the mixture is again left at rest, and the water drawn off as before. Where much particularity is used in the preparation, this process is repeated a third time, and yet oftener, that every extraneous matter may be dissolved or washed away, leaving the starch in a state of purity. When this desired object is obtained, the moisture is evaporated by placing it on clean cloths, and exposing it to the influence of the sun. When thoroughly dried it is fit for use. It will keep for a length of time without spoiling.

A new species of arrow root, obtained from an Indian plant, which is nearly as good as that from the West Indies, is now brought to this country.

THE BANANA.

Of all the fruits of the earth, to the growth of which the soil and climate of Mexico are favourable, the banana is the production which claims the first rank in importance.

Humboldt doubts whether there is any other plant on the globe which, in so small a space of ground, can produce so great a mass of nutriment. Eight or nine months after the sucker had been inserted in the earth, the banana begins to form its clusters, and the fruit may be gathered in less than a year. When the stalk is cut, there is always found among the numerous shoots which have put forth roots, one that bears three months later. A plantation is perpetuated without any other care than that of cutting the stems on which the fruit has ripened, and giving the earth a slight dressing. A spot of 1,076 feet, may contain at least from thirty to forty plants, which, in the space of a year, at a very moderate calculation, will yield more than 4,100 lb. avoirdupois of nutritive substance. Humboldt estimates, that the produce of the banana is to that of wheat as 133 : 1, and to that of potatoes as 44 : 1.

In America numerous preparations are made of this fruit, both before and after its maturity. When fully ripe it is exposed to the sun, and preserved like our figs; the skin becoming black, and exhaling a peculiar odour like that of smoked ham. This dry banana (*platano passado*), which is an object of commerce in the province of Mechoacan, has an agreeable taste, and is a very wholesome article of food. Meal or flour is obtained from it, by being cut into slices, dried in the sun, and pounded.

It is calculated that the same extent of ground in Mexico on which the banana is raised, is capable of maintaining fifty individuals; whereas in Europe, under wheat, it would not furnish subsistence for two; and nothing strikes a traveller more than the diminutive appearance of the spots under culture round a hut which contains a numerous family.

The region where it is cultivated produces also the valuable plant (*Jatropha*), of which the root, as is well known, affords the flour of manioc, usually converted into bread, and furnishes what the Mexicans call *pan de tierra caliente*. This vegetable is only successfully grown within the tropics, and in the mountainous region of Mexico is never seen above the elevation of 2,625 feet. Two kinds are raised, the sweet and the bitter. The root of the former may be eaten without danger, while the root of the latter is a very active poison. Both may be made into bread; but the bitter is preferred for this purpose, the poisonous juice being carefully separated from the fecula, called cassava, before making the dough. Raynal asserted that the manioc was transported from Africa to America to serve for the maintenance of the negroes; but Humboldt shows that it was cultivated there long before the arrival of Europeans on that side of the Atlantic. The bread made of it is very nutritive; but, being extremely brittle, it does not answer for distant carriage. The fecula, however, grated, dried, and smoked, is used on journeys. The root loses its poisonous qualities on being boiled, and in this state the decoction is used as a sauce, although serious accidents sometimes happen when it has not been long enough exposed to heat. The husbandry of it, we may observe, requires more care than that of the banana. In this respect it resembles the potato; and the roots are ripe in seven or eight months after the slips have been planted.

THE MAIZE.

The cultivation of maize is more extensive in New Spain than that of the banana and manioc. Advancing towards the central plains, we meet with fields of this important plant all the way from the coast to the valley of Tolucca, which is upwards of 9,186 feet above the sea. Although a great quantity of other grain is produced in Mexico, this must be considered as the principal food of the people, as well as of most of the domestic animals, and the year in which the maize-harvest fails, is one of famine and misery to the inhabitants. There is no longer a doubt among botanists, that this plant is of American origin, and that the Old Continent received it from the New.

Of all the gramina cultivated by man, none is so unequal as this in its produce, as it varies in the same field, according to the season, from 40 to 200 or 300 for one. If the harvests are good, the agriculturist makes his fortune more rapidly than with any other grain; but frightful dearths sometimes occur, when the natives are obliged to feed on unripe fruit, cactus-berries, and roots. Diseases arise in consequence; and these famines are usually attended with a great mortality among the children. Fowls, turkeys, and even cattle suffer, so that the traveller can find neither eggs nor poultry. Scarcities of less severity are not uncommon, and are especially felt in the mining districts, where the vast numbers of mules employed in the process of amalgamation annually consume an enormous quantity of maize.

Numerous varieties of food are derived from this plant. The ear is eaten raw or boiled. The grain when beaten affords a nutritive bread called arepa, and the meal is employed in making soups or gruels, which are mixed with sugar, honey, and sometimes even pounded potatoes. Many kinds of drink are also prepared from it, some resembling beer, others cider. In the valley of Tolucca the stalks are squeezed between cylinders, and from the fermented juice a spirituous liquor, called *pulque de mahis*, is procured.

A Concise and Practical Treatise on the Growth and Culture of the Carnation, &c.; including a Dissertation on Soils and Manures. &c. By Thomas Hogg, Florist. 8th Edition, with Additions. 8vo. London: G. and W. B. Whittaker. 1836.

Flower-growing in this country has become—under the encouragement of the prizes, as well as the praises of the rich—an art that is now pursued with increasing interest, and no doubt, like the other branches of national industry, will have, one of these sessions, an act of parliament to itself.

Nobody can find fault with such an amiable enthusiast as Mr. Hogg, for entertaining the harmless notion, that the culture of a carnation, and the care of an infant heir to these realms, are matters which equally challenge the grave solicitude of those who are solicitous for the happiness and glory of our common country. A minister of state can scarcely reckon up a greater number of anxious hours, than he who is periodically loaded with the responsibility of keeping up the suitable splendour of the pleasure garden. The site which his flower-pots are to occupy, as well in winter as in summer, demands much pondering, and great judgment. And what a season of patient preparation is his, before the sowing time arrives! It is not alone that the fundamental soil must be perfectly unobjectionable, but the artificial layer—the compost, from whose bosom the beautiful carnation is to rise, blushing and expanding—is beyond the hope of any man to fabricate, except he be free of the genuine brotherhood of the garden. How, otherwise, is it possible that he should be able, with discreet hand, to adjust the proportion of contradictory elements? to hold the scales evenly between yellow loam and maiden mould—between the sand of the pit, and the sweepings of the stall—redressing the arid and reluctant nature of the one, by the luxuriant richness of the other?

And when the infant plant shall have advanced into manifest existence, a new order of cares arises for the horticulturist. Small-pox, measles, the thousand ills to which the childhood of man is liable, are but imperfect types of those dangers that beset the helpless stages of the existence of a flower. There is the gathering of green flies to bear down upon it, a countless host—the corrosive ear-wig—the still more fatal grub, that entrenches itself in some adjacent subterraneous receptacle by day, and then, burglar-like, sallies forth in the hour of darkness, to lay waste both pod and petal, sparing neither blossom nor bud;—and there is, lastly, the wily wire-worm, that penetrates to the stem by sap and mine, wasting, by degrees, the life and beauty of the flower.

Safe from all these perils, the carnation must still be the object of tenderest attention. The irregular and premature disclosure of the contents of the pod—the feebleness of the young blossom—the hazard that the "winds of Heaven should visit it too roughly"—such are the accidents and calamities that keep the anxious gardener in a fever of doubt, for a season, until the full-blown carnation crowns his hopes and fills his heart with joy.

The christening of a flower is an event that must not be spoken of without due respect. Unhappily for those floral artists, whose literary education has been neglected, there is an uncommon scarcity of famous names at the present moment. There is not a single god or goddess of ancient mythology unappropriated at this day—all the British monarchs—the whole catalogue of British heroes, may be found in blossom, this very season, in one or other of the genteel nurseries that stand adjacent to the metropolis.

They who ponder, with delighted eye, over the matchless splendours of the annual Flower Show, little think to what an extent nature has submitted to a junction with art, in order to refine the charms of the carnation. The only true system of flower dressing was the invention of Kit Nunn, of Enfield, who began life as a barber, but followed horticulture from inclination—so irregularly alternating between the practice of the garden and of the shop, as sometimes to forget whether it was a curl or petal that demanded his attention. He succeeded, however, in applying the great principles of the friseur to the decoration of flowers; and towards the eve of an exhibition, the elegant Kitt was resorted to by gardeners far and wide, to submit their flowers to his exquisite finger. But still within the very precincts of the county where the artist flourished, people were found to think lightly of carnations; and, without presuming to adopt the language of censure on the occasion, Mr. Hogg quotes the case of a very singular preference for "heart's ease," in no less celebrated a personage than Mrs. Siddons herself. This lady cultivated a garden in the Harrow Road, where "heart's ease" was set with unsparing profusion. Her incessant demand for this flower, as soon as spring commenced, obtained, amongst the surrounding gardeners, the name of Miss Heart's-ease, for her pretty hand-maid and purveyor; nor is it forgotten, that the faithful delegate used to chaffer for her purchases in the severest spirit of thrifty dealing. In this retreat also, it is curious to find, what a partiality was shown for the cypress, the yew, the bay-tree, the spurge laurel, the widow-wail, every shrub of deciduous growth, every tree of mournful association. The tragic genius of the place seemed to haunt it in every part—

> "Her gloomy presence saddens all the scene,
> Shades every flower, and darkens every green."

Mr. Hogg's directions are so plain, so ample, so completely do they embrace every necessary act to be performed by the gardener, from the combination of the compost, which is to receive the embryo carnation, to the last and crowning display of art on the full-blown glowing flower, that perfection in the art will be no longer the lucrative mystery of his profession. The very lively and entertaining manner in which the work is written, is very strongly characteristic of the author's avocation; and as a mere source of amusement, the general reader may, with great advantage, apply himself to this book.

NOTICES OF A FEW NEW PLANTS GROWING IN THE COLONY OF BRITISH GUIANA.

1. *Guaco Brost*—so named by the Dutch creoles of Guiana, from being the principal food of the animal called Guanoco, is of the Laceita tribe, of a beautifully green colour, much esteemed by many of the older inhabitants as a delicate article of food. This plant grows in the rich alluvial plains of the Demerara and Essequebo rivers, runs for support and entwines itself on bushes and contiguous plants. It has not, as far as we know, been much noticed by writers on Botany, but from all the accounts given of the guaco, it has very great affinity. The flowers are corymbiform, axillary, of a dull whitish colour, and when mature of a reddish hue. Class syngenesia; order polygamia equalis; there are three fasciculi of florets in each tubular calyx; the stamina equal, style longer, terminating in double reflex hooks, one behind the other. They gradually ripen into down, which is wafted everywhere by the wind. It is always in flower in the rainy season, and wherever it grows its odoriferous exhalations perfume the air; its leaves are in opposite pairs, on long foot-stalks, cordiform and pointed, light green, rough, thick, succulent and easily broken; when rubbed between the fingers in a fresh state it smells something like, but more fragrant, than turpentine. It is of frequent use among old women as an excellent dressing—leaves bruised into a pulp in form of a poultice, for obstinate spreading ulcers of the impetiginous kind.

2. *Artstolochia—Siphoflora*—The flower of which is a striking representation of a German tobacco pipe, grows on the sandy banks of the Essequebo river; is a climber, ascending to the tops of the highest trees in its vicinity; the leaves solitary, alternate, three-lobed, flowers axillary. Class gynandria; order hexandria; no calyx; stamina situated outside and at the base of corolla; the pistillum is entirely immersed within it. The corolla forms the large crooked bowl, terminating in a long tube, inside studded with strong bristles on crimson bases, and gradually become fine hair as they descend the tube; this gives a marbled appearance to the flowers. The capsule is long,

hexagonal, six-celled, containing many black, triangular, flat seeds, packed over one another in close columns. The tobacco pipe plant has a peculiar strong smell, rather unpleasant, and of an extremely permanent bitter taste. It possesses highly powerful febrifuge and anthelmintic qualities, more especially, however, in the worm fevers of children, which usually in tropical climates, assume the remittent type; their commencement and exacerbations generally come on at night.

3. *Hura Crepitans—Sand Box-tree*—The capsules of which contain from twelve to fifteen white flat seeds enveloped in a strong parchment-like covering, of a milky agreeable taste, not unlike sweet almonds; but, after a while, leaves an acrimonious sensation on the palate and root of the tongue. They yield a large proportion of oil, possessing very active purgative properties; one or two of the seeds, eaten by an adult, operates to such a degree, with little or no griping, as to produce tenesmus; it however causes nausea, which acts with great energy on the biliary organs, and speedily evacuates the contents of the bowels. We are firmly of opinion, it is equally powerful and safer than the expensive and often adulterated croton oil. Seeds could be in great abundance easily procured (for the purpose of expressing the oil) from all the West India Colonies.

4. *Elaterium Reticulatum—Cucumis Agrestis Spinosus*—Grows common in cane field and pasture ground in Essequebo; flowers twice a year, January, February, and August and September. The fruit is oval, ribbed, prickly, not exceeding the size of a hen's egg; when ripe the skin is hard and coriaceous, inclosing a net-like web with three cells, in which are contained the seeds, which burst out of the capsule by the expansive force of vapour within, through an aperture which opens at the top. Before quite ripe the web contains a large portion of frothy bitter juice, which is strongly cathartic. The expressed juice collected and dried in the sun, forms a very active and convenient purgative extract.

THE WAICOURI OR WAIK ROOT.

The waik root or waicouri, so highly esteemed as a remedy in divers complaints, is the root of a nondescript plant growing in various inland situations of Guiana. It appears, in some respects, allied to the natural order of apocyneæ; in others to that of bignoniæ; and would seem, if our informants, the Padres of Carony, were correct, to have been for ages kept a secret among the Piaches (priests or physicians) of the aborigines, as a sovereign remedy for coughs, catarrh, and pulmonary complaints, as also in dysentery, scrofula, ulcers, &c.

It grows in a trailing or scandent vine, along the banks of the Rio Araturi, Imataka, the Caura, and other tributary streams of the Orinoko, where, by some natives, it is called Aremana, and vejuca de playa (but this applies to a different plant); in respect to its stem and evolutions, resembling the solanum dulcamara. The leaves are oval, pointed, and placed opposite on the stem. The flowers and fruit have not, to our knowledge, been described by any botanist. The root is fleshy and succulent, with a woody fibrous heart.

In sensible properties, it has a peculiar sub-acrid bitter taste when chewed. It is dug up in the dry season, bruised whilst fresh, and the expressed juice formed into an extract, or else the entire root is desiccated by exposure to heat and smoke, to prevent its decay, and the depredation of insects, to which it is very liable. The natives occasionally scrape a little off the dried root, and snuff it up the nostrils, to relieve themselves of catarrh.

FRENCH METHOD OF PREPARING AN ASPARAGUS BED.

The following mode of preparing an asparagus bed is practised in France: A pit, the size of the intended plantation, is dug five feet in depth, and the mould which is taken from it must be sifted, taking care to reject all stones, even as low in size as a filbert nut: the best part of the mould must then be laid aside for making up the beds. The materials of the bed are then to be laid in the following proportions and order: six inches of common dunghill manure, eight inches of turf, six inches of dung as before, six inches of sifted earth, eight inches of turf, six inches of very rotten dung, eight inches of the best earth. The last layer of earth must then be well mixed with the last of dung. The compartment must now be divided into beds of five feet wide, by paths constructed of turf, two feet in breadth, and one foot in thickness.

A NEW MODE OF CULTIVATING ASPARAGUS.

Permit the entire crop the two first years, and the greater part of it the third year, to run up to stalks; keeping the beds free from weeds, and stirring the surface. It is a common practice to sow onions, lettuce, &c. the two first years over the beds; and to plant cauliflower in the alleys between them. The advantage of this practice is questionable; and, at all events, it should not be continued after the plants are in full bearing. Having dug out the alleys the first season, instead of repeating that operation the next, lay on a coat of good dung three inches thick, and fork it evenly into the beds and alleys, and so on every season after, never digging out the alleys any more, as it is known the asparagus plant forms a fresh crown every season; and sometimes it happens, that in a few years the crown will increase almost into the alley; so, that by digging out this, you must inevitably spoil that plant: if this is not the case, when the beds are in good condition, the roots will be sure to work out at the sides into the alleys, and by digging out the latter, these roots must be cut off, and you will often see them exposed all the winter before dung can be got to fill them up: rather than be treated in this way, they had better be without any thing all the winter, as asparagus does not suffer generally by frost. The first two years you may have a very thin crop of celery plants or lettuce upon the beds, but nothing afterwards; nor should you plant anything in the alleys after the same period, for the asparagus is injured thereby.

THE COCOA NUT TREE.

The cocoa nut tree contributes more than many thousands of other plants to the necessities and comforts of man. A beautiful use of botanical knowledge is exemplified in the adage of the Hindu agriculturists, respecting the cultivation of this tree. They represent it as possessed of the faculty of speech, and that every plant of this genus enjoins upon its owner the duty which is implied in the following address: "Water me continually during my youth, and I will quench thy thirst abundantly during the whole course of my life." Amongst the products before alluded to, are the following:—

Toddy, a well known fermented liquor of the East, and mirra, a much milder beverage than toddy, having neither acidity nor spirit, are both drawn from the flower-bud or *spatha*. From toddy, the best arrack of the East is distilled, and from mirra, a kind of sugar called jagery is obtained.

From the fibrous husk, or outer shell of the nut, that part which lies within the smooth covering, a cordage is manufactured, which nearly equals that of hemp in strength, while it is not liable to be injured by immersion in sea water.

The kernel of the nut and the milk within, are both used as agreeable and nutritious aliment, and are too well known to need description. A large proportion of fixed oil is contained in the kernel, which is used in the East and in South America, and is exported largely from Ceylon to this country, where it is an article of increasing consumption.

The leaves are used entire as mats for sleeping upon. When split through the middle, they are woven into mats for covering sheds and houses. On the coast of Malabar, even for the largest edifices, these mats are applied to this purpose. Such roofs are considered preferable to those formed of straw, as they are lighter, equally strong, and more durable, while they do not attract rats and reptiles, like the latter. The finer nerves of the leaflets are woven into mats for the floors of the wealthy.

ON GINGER.

It is well known that this article is the root of a plant, and that the period when it is taken up for the purpose of commerce, is just before it has begun to put out any portion of the stem, being at that time succulent, whereas, if the plant is allowed to go to maturity, it becomes fibrous, and would not answer the purpose for which it is employed. In preparing the root, the following method is adopted. The young tubers are dug up, and are immediately scalded, then washed in cold water, and peeled. The operation requires three or four days for its completion, the water being frequently changed during that time. The roots being cleansed, are now placed in jars, and covered with a weak syrup, in which they are allowed to remain for two days, at the end of which period this is poured off, and replaced by a stronger syrup. This operation is repeated two or three times, at each time the syrup being made stronger, until it becomes of a rich and thick consistency, and the ginger appears bright and nearly transparent. The removed syrups are not wasted; these are made into a pleasant beverage, which is known in the West Indies under the name of "cool drink."

THE YELLOW POTATO.

The papas amarillas, or yellow potato, is considered by those who have eaten it in Peru, as far superior to any that we have in cultivation. It has been introduced into the garden of the Horticultural Society, and unfortunately has proved to be but an indifferent bearer. It is partial to particular climates, and even in Peru will not succeed in the valleys near the coast. The mode of culture is understood not to be at all different from that which is followed with respect to the common potato. When the stems are about a foot high, they are laid horizontally and earthed over, perhaps in order to encourage the formation of tubers from the buds. The people, however, said that it was not to any particular treatment that they attributed the successful cultivation of the plant, but entirely to the climate of the *hilly country*.

ON HYBRIDISING PLANTS.

The laws upon which the phenomena of hybridising depend, recommended themselves to the attention of practical persons, chiefly by the consideration that they afford one of the most important means of modifying the productions of nature, and making them better adapted than they are in their original state to the wants of man. The known laws by which hybrid plants are produced, are as follows:

Two distinct species of the same genus will often together produce an offspring intermediate in character between themselves, and capable of performing all its vital functions as perfectly as either parent, with the exception of its being unequal to perpetuating itself by seed; or should it not be absolutely sterile, it will become so in the second, third, or, very rarely, fourth generation. It may, however, be rendered fertile by the application of the pollen of either of its parents; in which case its offspring assumes the character of the parent by which the pollen was supplied. This power of hybridising appears to be far more common in plants than in animals; for while only a few animal mules are known, there is scarcely a genus of domesticated plants in which this effect cannot be produced by the assistance of man, in placing the pollen of one species upon the stigma of another. It is, however, in general only between nearly allied species that this intercourse can take place; those which are widely different in structure and constitution not being capable of any artificial union. Thus the different species of strawberry, of certain tribes of pelargonium, and of cucurbitaceæ, intermix with the greatest facility, there being a great accordance between them in general structure and constitution; but no one has ever succeeded in compelling the pear to fertilise the apple, nor the gooseberry the currant. And as species that are very dissimilar appear to have some natural impediment which prevents this reciprocal fertilisation, so does this obstacle, of whatever nature it may be, present an insuperable bar to the intercourse of different genera. All the stories that are current as to the intermixture of oranges and pomegranates, of roses and black currants, and the like, may therefore be set down to pure invention.

The cause of the sterility of mule plants is at present entirely unknown. Sometimes, indeed, a deficiency of pollen may be assigned; but in many cases there is no perceptible difference in the healthiness of structure of the fertilising organs of a male plant and of its parents. We know of no person who has attempted to prove this by comparatively anatomical observations, except Professor Henslow, of Cambridge; who, in an excellent paper upon a hybrid digitalis, investigated anatomically the condition of the stamens and pistillum, both of his hybrid and its two parents, with great care and skill. The result of his inquiry was, that no appreciable difference could be detected.

THE COW TREE.

All that relates to milk, and to the cereal plants, inspires us with an interest which is not merely that of the physical knowledge of things, but which connects itself with another order of ideas and feelings. We can hardly imagine how the human species could exist without farinaceous substances, and without the nutritious fluid which the breast of the mother contains, and which is appropriated to the condition of the feeble infant. The amylaceous matter of the cereal plants—the object of religious veneration among so many ancient and modern nations—is distributed in the seeds, and deposited in the roots of vegetables; while the milk which we use as food appears exclusively the product of animal organization. Such are the impressions which we receive in early childhood, and such is the source of the astonishment with which we are seized on first seeing, in South America, the cow tree. Magnificent forests, majestic rivers, and lofty mountains clad in perennial snows, are not the objects which we here admire. A few drops of a vegetable fluid impress us with an idea of the power and fecundity of nature. On the parched side of a rock grows a tree with dry and leathery foliage, its large woody roots scarcely penetrating into the ground. For several months in the year its leaves are not moistened by a shower; its branches look as if they were dead and withered; but when the trunk is bored, a bland and nourishing milk flows from it. It is at sunrise that the vegetable fountain flows most freely. At that time the natives are seen coming from all parts, provided with large bowls to receive the milk, which grows yellow and thickens at its surface. Some empty their vessels on the spot, while others carry them to their children. One imagines he sees the family of a shepherd who is distributing the milk of his flock.

CLEMATIS ORIENTALIS.

The general magnitude of this species resembles that of Clematis Flammula, from which it differs, in its ulterior branches being more persistently ligneous, though the main stem in old plants is seldom seen so thick as that of Clematis Flammula. It is also distinguished from the latter species by throwing up suckers freely, which the other does not. Its leaflets are glaucous, flat, large as compared with those of Clematis Flammula, and it does not produce flowers so profusely as that species; the flowers are yellowish, and not so strongly scented; and the carpels are dissimilar, though still cottony in appearance when the seed is ripe.

RECENT DISCOVERIES IN VEGETABLE PHYSIOLOGY.

WHILE the spirit of physiology has been taking possession of almost all the other natural sciences, it seems somewhat unaccountable that it should have been so long in transfusing itself into the accumulated mass of observation and experiments which constitute the science of vegetable physiology. By the labours of Grew, Lewenhoek, and many accurate observers who followed in their footsteps, the structure of the organs of plants has been ascertained with tolerable correctness; and a very considerable amount of information respecting the functions of those organs has been derived from the experiments and reasonings of Duhamel, Hales, Malpighi, and others. Still, however, the physiology of plants has never yet assumed the form and dignity of a science. The *mens divinior* was wanting, to separate its essential from its useless facts, to groupe them under general principles, and to exhibit those primary laws, which are absolutely necessary to the progress of science. The accumulation of facts and experiments had almost overwhelmed the few points of rational theory of which vegetable physiology could boast, and a number of doctrines half established, and speculations ingenious and plausible, usurped the place of fixed principles and rigorous views.

That such was lately the state of this branch of natural science will probably be disputed by its more ardent votaries; but a few observations will, we think, satisfy the candid inquirer of its truth. That plants derive their nourishment from the soil in which they grow, and that this nourishment, in the state of a fluid, is absorbed by the roots, and ascends through the stem and branches, are facts which must have forced themselves upon the notice of the most careless observer; but, through what channels the fluids thus absorbed rise in the plant, and by what forces they are sustained in the most elevated branches, contrary to their natural gravity, no physiologist could decide, till within these few years. As the vessels of the largest plants were of a capillary nature, the force of capillary attraction was almost universally regarded as the primary agent in producing the ascent of the sap; and as no other force could be found, an opinion so plausible seems never to have been subjected to a rigid examination. Although the force of capillary attraction increases with the smallness of the tube which exerts it, yet, however small a capillary tube may be, and however great may be the affinity which its substance has for the fluid it contains, *the force which it exerts upon the fluid never can raise it to the top of the tube, and cause it to flow from its upper orifice.* Here, then, we have a criterion, by which we can ascertain whether or not the sap of plants ascends by capillary attraction. If the sap rise to the top of the capillary vessels, and flow over their summits, its ascent and its discharge must be produced by some other power than capillary attraction. That the sap thus ascends, and then overflows, is too notorious to require even to be stated;—nay, if we cut a portion out of the stem of some plants, the sap of the exscinded portion will flow out at both of its extremities, an effect which would be prevented in place of being promoted by capillary attraction. Hence it is demonstrable that, whatever may be the influence of the capillarity of the vessels of plants, there must be some other power than that of capillary attraction which produces the ascent of the sap.

In this state of the subject, the improvement of the microscope promised to throw a brilliant light upon the functions of vegetable bodies; but the results by which the expectations of physiologists were thus highly raised, have, we fear, been entirely illusory, and have retarded, rather than advanced, the science. So long ago as the year 1774, the Abbé Corti observed a sort of circulation in the sap of the *chara vulgaris;* and, more recently, Professor Treviranus of Bremen, Professor Amici of Modena, and Dr. Martius of Munich, have studied and described the same class of phenomena.

In every part of the *chara vulgaris*, in the most delicate fibres of the root, as well as in the finest green tendrils of the stem and branches, Professor Amici observed a regular circulation of the contained sap. He saw transparent globules of various sizes circulating in regular and uninterrupted motion, in two opposite alternating streams in the two halves or sections of the same single cylindrical canal or vessel, which runs lengthwise through the fibres of the plant, interrupted at certain intervals by knots, and closed by a partition, which limits the cycle. In general, this motion is perpendicular up and down; but, in some fibres, it is spiral, so that the ascending currents, which were seen at first on the right hand, appear next on the left, and *vice versâ.* In the single central canal of the fibres of the root, the circulation is quite simple; but, in the green tendrils of the plant, the great central canal is surrounded by a number of similar small vessels, which have all the same structure. Each of these vessels is divided from the great canal by appropriate partitions, so that they can be completely separated from it; and each of them has a similar perpendicular or spiral circulation peculiar to itself.

If the circulation in one of these vessels be interrupted, as by a natural knot, which may be done either by bending the vessel to an acute angle, or by slightly tying it across, the same circulation will take place in the vessel thus shortened, that previously existed in it while it had its original length. If the ligature be removed, or if the vessel be bent back to its former shape, the original motion will also be renewed. If one of the vessels be cut transversely, the sap which it contains will not immediately and entirely flow out, but only the portion of it which is flowing towards the cut, the other continuing its course. Vinegar deadens the motion, and prevents even the flowing of the sap from a divided vessel.

With the view of determining the cause of these most singular movements, Professor Amici examined carefully the structure of the vessels. He found them to be formed of an exceedingly delicate membrane, smooth, white, and transparent, and having regular parallel greenish stripes, running in a perpendicular or spiral direction, according to the direction in which the included sap circulates. Between the stripes of each half of the vessel, that is, between the two currents which flow up and down, there is always a smooth interval of the membrane without stripes, of the breadth of six or more stripes. Of these smooth intervals, each vessel contains two of equal breadth, exactly opposite to each other, and between these the stripes (which, when the vessel is cylindrical, are divided by the intervals into two equal semicircles) are equally distributed.

The intervals without stripes, which exactly intersect the diameter of the circular section of the cylindrical vessel, form the partitions between the two streams, and here the circulation is very sluggish and interrupted. The stripes themselves, which are of different compactness and strength, and of which above a hundred may be counted in both semicircles of the vessel, are raised and attached to the internal part of the membrane; and as the motion of the sap globules was always most rapid where the stripes were most compact and strongest, Professor Amici inferred that they have an influence on the mode and degree of the circulation. With a power of 455, the stripes seem to be composed of small green globules, strung together like a row of beads. They differ from the sap globules by their green colour, and they do not mix with them when they are pressed out together from a divided vessel. Vinegar causes the green globules to come out singly or in pairs, or with several hanging together like the fragments of a chain, in which case they appear to be kept together by an extremely delicate membrane.

As the singular movement above described cannot possibly be explained by any of the hypotheses assumed to account for the motion of sap in plants, Professor Amici resorts to the never-failing auxiliary of galvanic agency. He conceives that the green stripes are voltaic piles, and he considers this hypothesis supported on the one hand by the construction of the stripes, and on the other by the known fact, *that by means of galvanism water may be conducted from the positive to the negative pole, raised, contrary to the laws of hydraulics, above its level, and made to pass through the pores of a bladder which are otherwise impermeable.*

A fact analogous to those above described was observed by

M. Schultz of Berlin. Having noticed a rapid movement of the sap in the nerves of a leaf of *Chelidonium majus*, when examined by the microscope, he was led to examine the phenomenon more attentively, and he satisfied himself that he saw two distinct currents, namely, one ascending and another descending. After numerous observations, both M. Schultz and M. Savi were convinced that these movements were not illusory, and this conviction was strengthened by the fact that there was an intermission in the motion of the currents, the tremor suddenly ceasing, and again recommencing with the same velocity.

It is impossible, we think, to read the preceding account of the observations of Amici and Schultz, without believing that they have thrown a stumbling-block in the path of physiological inquiry. If we suppose that the growth of plants is effected by movements so complicated and apparently so capricious, arising from the physical agency of organs so minute and so far beyond the reach of accurate examination, the progress of vegetable physiology must be beset with difficulties of the most appalling kind; and if, on the other hand, we regard the microscopical observations as entirely illusory, or even if we reject as false the conclusions which have been drawn from them, we must renounce the aid of the microscope in the examination of those functions which are carried on by the agency of minute portions of organized matter.

Under such difficulties as these, M. Dutrochet began his researches in physiology. He accordingly commenced his labours by an examination of the supposed circulation observed by Schultz and Savi, for he does not seem to be aware of the previous observations of Corti. Upon subjecting the leaf of the *Chelidonium majus* to the microscope, he obtained the following results:—

1. The tremulous movement continues after the separation of the leaf from the plant.

2. When the nerve of the leaf is cut transversely in two places, the motion is still seen in the insulated portion.

3. The movement ceases when the temperature falls to 34 deg. of Fahrenheit, and does not re-appear in the same leaf till the temperature rises to 66 deg.

From these observations, M. Dutrochet conceives that the movement is not a circulating one, but probably only a local displacement of the molecules of the yellow juice of the plant. This view of the matter is confirmed by an analogous fact observed by M. Dutrochet. In the vessels of a minute portion of the ear and mesentery of a mouse, some time after the animal was dead, he observed an intermission in the tremulous motion, exhibiting the appearance of a current within the vessels, though nothing flowed from their extremities. In like manner a thin stratum of venous or arterial blood, when placed on a piece of glass and exposed to solar light, exhibited, previous to its coagulation, the same phenomena which are observed in the leaf of the *Chelidonium majus*. Hence M. Dutrochet concludes that it is a vital and a corpuscular movement of an unknown nature.

With respect to the vitality of the phenomenon we cannot agree with our author. We have observed analogous movements in the sap of certain plants more than a year after it was taken from the tree, and we have no doubt but that they are the consequences of certain mechanical and physical changes in the state of the molecules, and of their mutual attractions. In confirmation of this view of the subject, we shall submit to the reader the following notice of analogous phenomena, observed by Dr. J. L. Drummond of Belfast.

"While investigating the anatomy of the eyes of fishes, I washed off the back silvery part of the choroid coat of the haddock with a hair pencil, and about half a tea-spoonful of water. The latter became of a milky colour, and on examining a drop of it with an Ellis's aquatic microscope, I found the milkiness to be owing to innumerable slender flat silvery spicula, which had composed the substance of the choroid. They seemed to be *in constant motion, apparently rolling upon their axes*, but having no degree of progressive movement. The light reflected from their surface was very brilliant, like that from polished silver, and often disappeared and again returned with alternations so rapid, as to produce a twinkling very like that of a fixed star.

"Sometimes on examining an individual specimen it would disappear altogether, but in a few minutes return, renew its twinkling and apparent revolution upon its axis, and again disappear to return as before.

"Frequently also some were observed to be in the fluid, or on its surface, for a long time motionless, but very brilliant; and they would give a few slight twinkles, seem to turn round, and almost disappear; then resume their original situation for a moment, appear more brilliant than at first, partly disappear, again and again return, and so on for a number of times, till at length they would disappear entirely; but after a time, perhaps five or ten minutes, shew themselves in the same spot as before. These observations could be made only on the larger spicula, the minute ones being in incessant motion.

"On the first examination of this appearance, it seemed probable that the motion might be communicated by animalcula swimming through the fluid, and that these had been propagated after the death of the fish, as the eye was not quite fresh. Soon afterwards, however, I examined the choroid, in the same way, from a flounder, before it was quite dead. The same appearance presented itself, if possible still more lively; and I found also that it continued in many of the spicula *after exposure to the heat of boiling water*.

"Since that period I have observed the same phenomena in the choroid of all the fishes which I have examined, in the cartilaginous as well as the bony. *The motion continues in a great many of the spicula even after the fluid containing them has become putrid;* but it is then more slow. The addition of ardent spirits deadens but does not destroy the motion. *After exposure to the heat* of boiling water, the number of spicula seems much diminished, and those which remain move less rapidly than before. The addition of vinegar in a quantity equal to the fluid containing the spicula, suddenly causes a great diminution in the number of moving ones, probably from coagulating the albuminous matter, which had been washed from the eye along with the spicula, and entangling them in it. Many, however, continue their motion as before."

Although Dr. Drummond has adopted the opinion, as the least improbable one, that these particles are endued with animalcular life, yet we conceive this notion quite untenable, from various experiments which we have made, but of which this is not the place to give any account.

Having disencumbered the subject of the inferences from the experiments of Corti and Schultz, M. Dutrochet commences his inquiry with the determination of the channels by which the sap is conveyed through plants. M. Decandolle had supposed that the sap ascends through what he calls the *lymphatic vessels*, the *fausses tracheæ* of Mirbel; and the truth of this conjecture has been put beyond a doubt by M. Dutrochet. These vessels are situated both in the laburnum and the heart wood, but they are never found in the bark nor in the medulla. These sap-vessels are simple tubes without valves, and have no lateral communication with each other.

That the force which causes the sap to ascend through these vessels resides in the roots, may be readily proved, according to M. Dutrochet, by the following fact:—If in spring we cut the stem of a vine close to the ground, the separated portion of the stem ceases to bleed, while the surface of the portion attached to the roots continues to bleed freely. If we make successive sections, proceeding downwards, till we reach the radicles, the same effect will be produced; and hence it follows, that the force which causes the sap to flow from the divided extremity of the plant, must reside in the *spongiole*, or small conical body which forms the termination of each radicle.

Our limits will not permit us to enter into the details of these experiments which first led M. Dutrochet to the discovery of the force now mentioned. Our principal object is to show how he established the leading doctrine, and we must, therefore, refer to his own work for an account of minor and collateral details.

Having taken the cæcum, or blind-gut of a young chicken, and cleaned it with pure water, he filled it half full with 196 grains of milk; and having tied up its open extremity, he placed it in water. At the end of 24 hours the cæcum had imbibed 73 grains of water; and in 12 hours more the quantity of water imbibed was 117 grains, and the cæcum had become turgid. From this period the cæcum experienced a gradual diminution of weight, and at the end of 36 hours it had lost 54 grains of the water which had formerly entered it, and the contained milky fluid had grown putrid. Here, then, we have exhibited to us two opposite actions of the organic membrane;—1st, that by which the water is imbibed; and 2nd, that by which it is expelled. In the first of these cases the milk, or internal fluid, was denser than the water, or external fluid; and while this state of the fluid continued, the cæcum continued to imbibe the water; but as soon as the milky fluid became putrid, and thinner than the external water, the latter passed out of the cæcum as rapidly as it formerly entered it.

As the turgidity produced by the imbibition of the water in the preceding experiment stretches the sides of the cæcum, so as to cause them to re-act on the inclosed fluid, M. Dutrochet was of opinion that this re-action would be capable of causing the fluid to rise in a tube fixed to the cæcum, when in a state of endosmose. He accordingly took a glass tube 24 inches long, and about one fifth of an inch in bore, and fixed one end in the cæcum of a chicken containing a solution of gum arabic. The glass tube being held in a vertical position, and the cæcum being immersed in rain water, the inclosed fluid rose in the tube, and at the end of 24 hours it began to discharge itself from the upper orifice. This overflow continued for two days, when it began to sink. Upon opening the cæcum on the fourth day, the inclosed fluid was found in a state of putridity. M. Dutrochet obtained similar results by substituting for the cæcum the inflated bladder of the *Colutea arborescens*, or bladder senna.

Having thus discovered a force capable of impelling the sap imbibed by the spongioles into the cells and capillary vessels of plants, M. Dutrochet was desirous of ascertaining the cause of so singular an effect. An experiment by Porret, to which Professor Amici no doubt alludes in the passage already quoted, could not fail to suggest, that the phenomenon exhibited by animal or vegetable membranes was the result of electrical action. This chemist, having divided a cylindrical jar into two compartments by a piece of bladder, he filled one of the compartments, and left the other almost empty, with only a few drops of water in it. When the zinc pole of a galvanic pile was placed in the full compartment, and the copper pole in the empty one, the water passed from the full into the empty compartment, and rose in the latter much higher than it originally stood in the former. Following up the idea suggested by this remarkable experiment, M. Dutrochet tied the extremities of two tubes, one of which was capillary, to the pod of the *Colutea arborescens*. He now introduced the *negative* wire of the galvanic pile through a cork in the ordinary tube, into the pod, and then immersed the *positive* wire into a vessel of water in which the pod was placed. The pod quickly became turgid by the imbibition of the external water, and the water rising in the capillary tube, flowed over its upper extremity exactly in the same manner as it would have done in virtue of the force of endosmose, had the pod separated two fluids of different densities. The same result was obtained by substituting the cæcum of a chicken in place of the vegetable membrane. That endosmose is an electrical action, was rendered highly probable by the following experiment:—M. Dutrochet introduced the white of an egg into the cæcum of a chicken, and when it was nearly full, he closed it and plunged it in water. The cæcum became speedily turgid; and after the acion had continued some hours, a layer of coagulated albumen was found upon its inner surface—one of the known effects of voltaic action.

From the experiments which we have now briefly described, we are entitled to conclude with M. Dutrochet, *That it is by the action of endosmose that the sap is raised to the highest summits of trees, contrary to its natural gravity;* and that this new force is the result of electrical action.

As M. Dutrochet was not able to detect by the galvanometer any direct indications of electrical action during the process of endosmose, his speculations on this point were regarded as entirely hypothetical; and the force of endosmose was considered only as the result of a capillary action upon heterogeneous fluids.

This attempt to refer his discoveries to principles long ago recognised, was made by the celebrated French mathematician, M. Poisson. If two fluids of different density, and whose altitudes are in the inverse ratio of their densities, are separated by a membrane whose capillary canals are permeable to these fluids, the pressure exerted upon the orifices of these canals will be equal on each side of the membrane; but as, owing to the different densities of the fluids, the capillary force is unequal, it necessarily follows, that the fluid exposed to the stronger capillary action will fill the capillary canals of the membrane. But the small portion of fluid which thus fills these canals will be acted upon by two opposite forces—by the attraction of the fluid to which it belongs, and by the attraction of the fluid on the opposite side of the membrane. But as the last of these forces is stronger than the first, it follows that the portion of fluid contained in the capillary canals will flow without ceasing in the direction in which it is drawn by the most powerful attraction, and will thus add to the mass of fluid to which it is attracted. This current across the membrane will continue till the difference of the pressures which the two fluids exert in the ratio of their altitude is equal to that of the attractions exerted by the two fluids upon the portion of fluid contained in the capillary canals. Such is the general result of the mathematical theory of M. Poisson; and as it affords a precise explanation of endosmose, viewed as a separate and insulated fact, it might have checked the researches of M. Dutrochet, and deprived the natural sciences of that great light with which he was destined to illuminate them. The ardour of discovery, however, was in his mind too powerful to be thus subdued. He examined the subject in new aspects;—he interrogated nature by new experiments, and was thus led to place his discovery upon an impregnable basis.

According to the theory of M. Poisson, the action of the membrane upon two heterogeneous fluids ought to produce a current towards that which has the greatest force of attraction; but M. Dutrochet found *that there were two currents across the membrane, opposite in direction and unequal in strength*—a fact which is entirely inexplicable by any law of capillarity with which we are acquainted, and which therefore renders the explanation of M. Poisson quite untenable.

M. Dutrochet, however, was not satisfied with this defence. He advances into the very heart of the subject, and shows that the phenomena of accumulation and ascent which actually take place, are, in some cases, the very reverse of what they should be in virtue of capillary action. According to the theory of M. Poisson, the accumulation of fluid ought always to take place on the side of the membrane where we place the fluid which rises to the least height in capillary tubes. We shall now see, in the words of M. Dutrochet, what actually takes place.

"Fluids of greatest density rise, in general, least in capillary tubes; but the density is not the only cause which here determines the lesser ascent of the fluid, for we know that some fluids which have very little density rise very little in capillary tubes. Thus it is that alcohol and ammonia, though less dense than water, rise to a less altitude than it in capillary tubes. Here the chemical qualities of the fluid produce the same effect as its excess of density. But I have observed that when an organised membrane is made to separate a fluid which rises less than water in capillary tubes, the accumulation of the fluid takes place *on the side of that which ascends least in capillary tubes.* In this case, then, there is a constant relation between the accumulation of the fluid and the phenomenon of capillary attraction. Let us now study what takes place with other fluids.

"The height of ascent of distilled water in a capillary tube

being represented by	10 degs.
Olive oil rises in the same tube to	67
Essential oil of lavender rises to	58
Alcohol at 36 degrees rises to	47

If we now put *olive oil* in communication with *essential oil of lavender*, by separating them with an organic membrane, we shall find that the accumulation of the fluid takes place on the side of the oil of olives, that is, *on the side of the fluid which ascends the most in capillary tubes.* This action, which is very feeble, requires a temperature above 59 degrees of Fahrenheit in order to become appreciable.

"If the *essential oil of lavender* is put in communication with *alcohol* in the same way, we shall find the accumulation take place on the side of the essential oil, that is, *on the side of the fluid which ascends the most in capillary tubes.* This action is more energetic than the preceding. Essential oil of turpentine comports itself in these experiments like the essential oil of lavender, and I am of opinion that this ought to be the case with other essential oils."

Another property of capillary attraction enabled M. Dutrochet to confirm these ingenious views. It has been long ago ascertained that *an increase of temperature diminishes the height to which fluids rise in capillary tubes.* Hot water, for example, and heated alcohol, ascend to a less height than the same fluids when cold. Now, the force of endosmose *is always increased* by an increase of temperature, and consequently can have no connexion with the force of capillary attraction.

As these experiments clearly demonstrate that the phenomena of endosmose are in some cases the same that should take place if they were produced by capillary action, and in other cases quite the reverse;—and as the theory of capillarity is inconsistent with the existence of two unequal currents flowing through the membrane in opposite directions, we may consider it as demonstrated that the mathematical theory of M. Poisson cannot account for the effects of this new power.

(*To be continued*).

DR. CAREY.

Dr. Carey, whose Memoirs has just been published, was an enthusiastic botanist; he edited Roxburgh's Flora Indica, and otherwise greatly distinguished himself as an ardent admirer and cultivator of this science. We extract a few particulars which place his devotedness to natural history in general, and this portion of it in particular, in a remarkable point of view.

"In objects of nature my father was exceedingly curious. His collections of mineral ores, and other subjects of natural history, was extensive, and obtained his particular attention in seasons of leisure and recreation. The science of botany was his constant delight and study; and his fondness for his garden remained to the last. No one was allowed to interfere in the arrangements of this his favourite retreat; and it is here he enjoyed his most pleasing moments of secret devotion and meditation. The arrangements made by him were on the Linnæan system; and to disturb the bed or border of the garden was to touch the apple of his eye. The garden formed the best and rarest botanical collection of plants in the east; to the extension of which, by his correspondence with persons of eminence in Europe and other parts of the world, his attention was constantly directed; and, in return, he supplied his correspondents with rare collections from the east. It was painful to observe with what distress my father quitted this scene of his enjoyments, when extreme weakness, during his last illness, prevented his going to his favourite retreat. Often, when he was unable to walk, he was drawn into the garden in a chair placed on a board with four wheels.

"In order to prevent irregularity in the attendance of the gardeners, he was latterly particular in paying their wages with his own hands; and on the last occasion of doing so, was much affected that his weakness had increased and confined him to the house. But, notwithstanding he had closed this part of his earthly scene, he could not refrain from sending for his gardeners into the room where he lay, and would converse with them about the plants; and near his couch, against the wall, he placed the picture of a beautiful shrub, upon which he gazed with delight.

"On this science he frequently gave lectures, which were well attended, and never failed to prove interesting. His publication of 'Roxburgh's Flora Indica,' is a standard work with botanists. Of his botanical friends he spoke with great esteem; and never failed to defend them when erroneously assailed. He encouraged the study of the science wherever a desire to acquire it was manifested. In this particular he would sometimes gently reprove those who had no taste for it; but he would not spare those who attempted to undervalue it. His remark of one of his colleagues was keen and striking. When the latter somewhat reprehended Dr. Carey, to the medical gentleman attending him, for exposing himself so much in the garden, he immediately replied, that his colleague was conversant with the pleasures of a garden, just as an animal was with the grass in the field."

A Natural System of Botany; or, a Systematic View of the Organization, Natural Affinities, and Geographical Distribution of the whole Vegetable Kingdom, together with the Uses of the most important Species in Medicine, the Arts, &c. By John Lindley, Ph. D., F.R.S., L.S.G.S., &c. Professor of Botany in the University of London, &c. &c. 2nd. Edition, with numerous Additions and Corrections, and a complete List of Genera, with their Synonyms. 8vo. Price 18s. in cloth.

Amongst the many improvements which a more diffused and liberal system of education is everywhere producing around us, there are none to be contemplated with greater satisfaction, than those which serve to render mankind familiarly conversant with the works of nature. It is, indeed, truly wonderful that those works, enchanting above all the miracles of art for their number, their variety, their beauty, and their harmony, should ever have been neglected in any nation, whether savage or civilized. Were we to awake in the middle of the night, and looking out upon the sky to see it illumined for the first time by the full moon, we should remain to gaze upon it with intense admiration, and follow it with trembling delight through its path in the heavens, until it faded away from our eyes in the lustre of morning. How astonished should we not be, were we, in like manner, to behold but once or twice in our lives, the myriads of worlds, which we call stars, suspended in the canopy of azure, that spreads above us, like so many golden fires, to light and beautify our world. To descend to lesser things, what should we think, if now, for the first time in the course of ages, the summer were heralded by groups of those winged insects, which, under the name of butterflies, shine in all the colours of the rainbow, and perform their evolutions with so much apparent enjoyment among the flowers which ornament our gardens and our fields? We should be lost in astonishment at the uniform elegance and taste, the variety and splendour of the style in which their wings were painted. But were we enabled to learn, by studying their history, that all these bright and happy creatures had been, but some little week or two before, nothing more than the dull wretched-looking caterpillars, which devoured the leaves of our fruit trees, and crawled along in our paths, the objects of our pity or contempt, we should be electrified by the discovery, and feel that we were, indeed, living in a sacred place, a place of mysteries and of influences beyond our comprehension—the laboratory of an Almighty power, in which every thing bears witness to His presence.

And can these salutary, these gratifying feelings of admiration, of astonishment, of conviction that we inhabit a land of mystery, never be produced, because we may behold the moon and stars almost every night, and because, from childhood upwards, we have seen the butterfly, and perhaps know a little of its history? Is it an unavoidable consequence of our familiarity with natural objects, that they have no attractions for us, and can afford us neither entertainment nor instruction? No one will answer these questions in the affirmative, who has the good fortune to be initiated even in the elements of natural history. We do not speak of those persons who make nature the study of their lives, and are perfect masters of all her productions. The labour which such persons undergo in the pursuit of their object is very considerable; but it is as nothing compared with the pure pleasures which they enjoy. It is not, however, necessary, in order to taste those pleasures to a certain degree, that we should be skilled in the construction of every plant, the anatomy of every bird, the habits of every insect, which we behold. The only condition which nature exacts, as the price of the gratification and mental improvement which her works can so abundantly yield, is simply a moderate attention to the ample volume which she has unfolded to man; a volume in which, if we may so say, the text is so peculiarly composed for his benefit, and so suited to his vision, that of all the myriads of eyes which look upon it, no eye but his can read, no mind save his, appreciate its sublime discourse.

This being our view of the delight which awaits the student of nature in the great temple of her mightiest as well as most minute works, we are glad to herald any undertaking which attempts, in any way, to unfold her hidden secrets, and classify her numerous and varied productions, as the work before us proposes to do; but we cannot help, in thus offering Dr. Lindley our meed of praise for the usefulness of his book, expressing our dissent from many of his views, which are calculated to give the uninformed very erroneous conceptions of the general design of this enchanting portion of Nature's loveliest and most splendid creations, and to lead him, if he follows his guide, to form the most absurd theories that ever came from that prolific source of nonsense, the brain of a philosophical egotist.

DUTROCHET ON ENDOSMOSE, OR THE RISING OF THE SAP IN PLANTS.

Endosmose arises from the reciprocal influence of *active fluids* upon *active solids*, and of *active solids* upon *active fluids*. If one of these elements of action is inactive, endosmose will not take place. When every thing, for example, is conveniently arranged for endosmose, this action will be suspended by the addition of a little sulphuric acid to the fluids, because this acid is an *inactive fluid*. In like manner, even if the two heterogeneous fluids are *active*, endosmose will not take place if the permeable plate or membrane is *inactive*. Thus we have demonstrated, that this phenomenon is the result of two actions combined; 1st, of the action of the fluids upon the solid, and, 2nd, of the solid upon the fluids. These two actions, which are undoubtedly electrical, have obviously their seat in the thickness, or in the substance of the permeable membrane or plate which constitutes the active solid. It is a *capillo-electrical* phenomenon, or one of *intra-capillary* electricity. This circumstance explains to us why this electricity is not indicated by the galvanoscope. It is not at all external, for it is in the capillary canals that this impulsive electricity is developed; and this electrical condition is given to the capillary canals in two ways: 1st, by the action of the two opposite poles of the pile on the two opposite faces of the permeable active membrane or plate; 2nd, by the contact of two active heterogeneous fluids on the two opposite faces of the same membrane or plate. Thus it is the influence of the contact of the fluids upon the solid which communicates to the latter the *capillo-electrical* state, and it is this influence of the *capillo-electrified* solid upon the fluids which communicates to them their impulsion.

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DESCRIPTION OF THE PLATES.

ERODIUM ROMANUM.

ROMAN HERON'S BILL.

Monadelphia Pentandria.

Gen. Char.—Calyx five-leaved. Petals 5. Scales 5, alternate, with filaments, and honey glands at the base of the stamens. Cocci 5, one-seeded.

Spec. Char.—Nearly stemless. Leaves pinnate, with ovate, pinnatifid segments. Petals equal, larger than calyx.

This lively little plant begins flowering in April, and continues to do so during most of the summer months, producing seeds in abundance, which, falling on the ground, vegetate, and increase the plant; a dry situation suits it best; and it is well calculated to grow among stones or rock-work.

Its seeds are a curious object; the manner in which they are detached when perfectly ripe, in hot, dry weather, and the screw-like form which the tail of the arillus quickly assumes, is highly deserving of attention.

SPARTIUM SCOPARIUM.

COMMON BROOM.

Diadelphia Decandria.

Leguminosæ.

Gen. Char.—Filaments all united into a tube at the base. Stigma linear, hairy. Legume flat.

Spec. Char.—Leaves oblong, ternate, or solitary. Branches angular, unarmed. Flowers axillary. Peduncles short. Legume many-seeded, fringed.

This is a large, indigenous shrub, growing plentifully on dry sandy heaths and waste places; flowering in May and June.

It is a bushy plant, from three to eight feet in height, with innumerable ascending, long, straight, angular, smooth, dark, evergreen twigs. The leaves are deciduous, sessile, scattered, petioled, and ternate; but the upper ones are generally simple; the leaflets are small, obovate, entire, and smooth, but silky when young. The flowers are papilionaceous, large, and showy, very numerous, axillary, solitary, or in pairs, on simple stalks, longer than the leaves, of a deep golden yellow, sometimes tinged with orange, and occasionally of a pale lemon colour. The calyx is cup-shaped, bilabiate, reddish-purple, having the upper with two, the lower with three small teeth. The corolla consists of five petals; the standard inversely spear-shaped, the whole reflexed, very large; the wings ovate-oblong, connected with the filaments; the keel of two petals lanceolate, oblong, attached to the filaments, and connected at the lower margin by soft hairs. The filaments are ten, all united into a single tube, and support oblong orange-coloured anthers. The germen is oblong, hairy; the style awl-shaped, curved, and the legume compressed, brown, oblong, ciliated, and containing about fifteen or sixteen small, compressed, shining seeds.

The leaves and tops have a disagreeable odour, and a nauseous bitter taste, imparted by infusion both to water and spirit. The tops and seeds are directed for medical use.

Broom tops have long been celebrated for their cathartic and diuretic powers, and have been successfully employed in dropsical cases.

An ounce of the green tops may be boiled in a pint and a half of water down to a pint, and a teacupful of this decoction given every hour till it operates freely on the bowels, and may be repeated every day, or every second day. The seeds and flowers are said to be emetic, but according to Woodville, "the evidence upon which this assertion rests is not wholly to be relied on, as the former, when roasted, have been recommended as a substitute for coffee, and the latter employed as a pickle."

ROSA LUTEA.

AUSTRIAN ROSE.

Icosandria Polygynia.

Rosaceæ.

Gen. Char.—Corolla urceolate, five-cleft, fleshy, contracted at orifice. Petals 5. Grains bony, hairy, included in the fleshy tube of calyx.

Spec. Char.—Prickles straight. Leaflets flat, concave. Calyx nearly naked, entire.

This species is found wild in Austria, and other parts of Germany; was cultivated in this country in the time of Gerard and Parkinson: it is a shrub of low growth, with weak stalks, which send out many slender branches, closely armed with short crooked brown prickles. The flowers grow on short peduncles, and appear in July: is very hardy, and readily propagated. Authors differ as to the scent of its flowers; Miller says they have none, others very little, and others that the little they have is very unpleasant; hence it has been called by Allioni, *Rosa fœtida;* in point of colour, they are subject to great variation; the red and yellow Austrian Rose is considered by Mr. Aiton as its principal variety. It is our intention to give a figure of this very showy plant in some future number of the Magazine, when we hope further to elucidate the subject by some practical observations.

CALENDULA TRAGUS.

BENDING-STALKED MARIGOLD.

Syngenesia Polygamia Necessaria.

Compositæ.

Gen. Char.—Receptacle naked. Pappus 0. Calyx many-leaved, sub-equal. Pericarps of the disk membranous

Spec. Char.—Leaves alternate, linear, sub-entire. Pericarps sub-orbiculate.

This species of Marigold, a plant not uncommon in our collections of greenhouse plants, is a native of the Cape, and was introduced by Mr. Masson in 1774.

It flowers in May and June, and is raised with facility from cuttings.

ANTHOLYZA MERIANA.

RED-FLOWERED ANTHOLYZA.

Triandria Monogynia.

Irideæ.

Gen. Char.—Corolla tubulous, irregular, recurved. Capsule inferior.

Spec. Char.—Corolla infundibuliform. Leaves ensiform.

Roots bulbous. Compressed. Shaped like a kidney. Covered with a fibrous brown skin. Leaves about a foot long, and an inch broad, ending in points. They are of a deep green colour, and rise immediately from the root. The stalk comes out from the root between the leaves, and rises a foot and a half high toward the upper part. The flowers are produced from the side, standing alternately at about an inch and a half distance from each other; they have each a spatha composed of two leaves. Before the flowers appear they are of the same green colour with the stalk, and are divided but a small part of their length; but afterwards they are split almost to the bottom, and wither before the flowers decay, becoming dry, and wrap round the seed-vessel. Tube of the flower narrow at the base, a little curved, and about an inch and a half long. Anthus dark brown, oblong; fastened in the middle to the apex of the stamens. At the bottom of the tube of the petals is situated an oval, three-cornered germ, supporting a slender style, crowned by three bifid reflex stigmas.

It is a much stronger plant than the *Antholyza Cunonia*, and though the colour of its flowers is not so splendid, the whole plant possesses more elegance.

It requires the same treatment as the Cape bulbs, succeeds very well, and produces plenty of offsets when planted in light sandy bog earth.

Flowers in May and June, and is propagated by offsets.

CANARINA CAMPANULA.

CANARY BELL-FLOWER.

Hexandria Monogynia.

Campanulaceæ.

Gen. Char.—Calyx six-leaved, campanulate. Stigmas six. Capsule inferior, six-celled, many-seeded.

Spec. Char.—Leaves stalked, hastate, smooth.

The flowers of this plant so strongly resemble those of the Campanula, that it is no wonder the older Botanists regarded it as such. Linnæus himself did so at first, and Miller also; and even now it may perhaps be doubted whether it ought to be made a distinct genus of, since it is found to differ principally in the number of its parts of fructification.

It is a native of the Canary Islands, whence its name; was cultivated in the royal garden, Hampton-Court, as long since as the year 1696; and is a tender herbaceous plant to be found in most of our greenhouses; its stem rises to the height of six or more feet; its flowers produced singly from the fork of the stalk, are large and shewy; they begin to open at the commencement of winter, and continue to blow till March.

It is propagated by parting of its roots, which must be done with caution; for, as the roots are fleshy, if they are broken or wounded, the milky juce will flow out plentifully; so that if these are planted before the wounds are skinned over, it occasions their rotting: the best time for transplanting and parting of their roots is July, soon after the stalks are decayed: the soil should be a light sandy loam mixed with a fourth part of screened lime rubbish.

ERICA VESTITA.

TREMULOUS HEATH.

Octandria Monogynia.

Ericeæ.

Gen. Char.—Sepals 4, persistent. Corolla 4-cleft persistent. Filaments inserted in the receptacle. Anther bifid. Capsules membranous 4-8 celled.

Spec. Char.—Anthers beardless, included. Leaves 4-6. Flower axillary. Bracteas remote. Limb of corolla revolute. Ovary with eight furrows, silky upwards.

The Erica Vestita is distinguished by its superior height, by having its stems very thickly covered with foliage remarkably fine and delicate, so as to be tremulous on the slightest shake, and by having blossoms of a beautiful crimson-colour.

It is raised with difficulty from cuttings—more readily from seeds—by those who are accustomed to it.

HIPPOCREPIS VALEARICA.

SHRUBBY HORSE-SHOE VETCH.

Diadelphia Decandria.

Leguminosæ.

Gen. Char.—Loment compressed, with many notches on one edge, curved.

Spec. Char.—Pods stalked, clustered, arcuate, rough, sinuated on one side.

Though not so ornamental as many of our rarities cultivated for show, it is found in most collections of greenhouse plants, recommending itself rather by the elegance of its foliage, than the beauty of its flowers; the latter appear in May and June, and with us are sparingly succeeded by seed-vessels.

The plant is a native of Minorca, and is propagated either by seeds or cuttings.

ŒNOTHERA ROSEA.

ROSE-COLOURED ŒNOTHERA.

Octandria Monogynia.

Onagariæ.

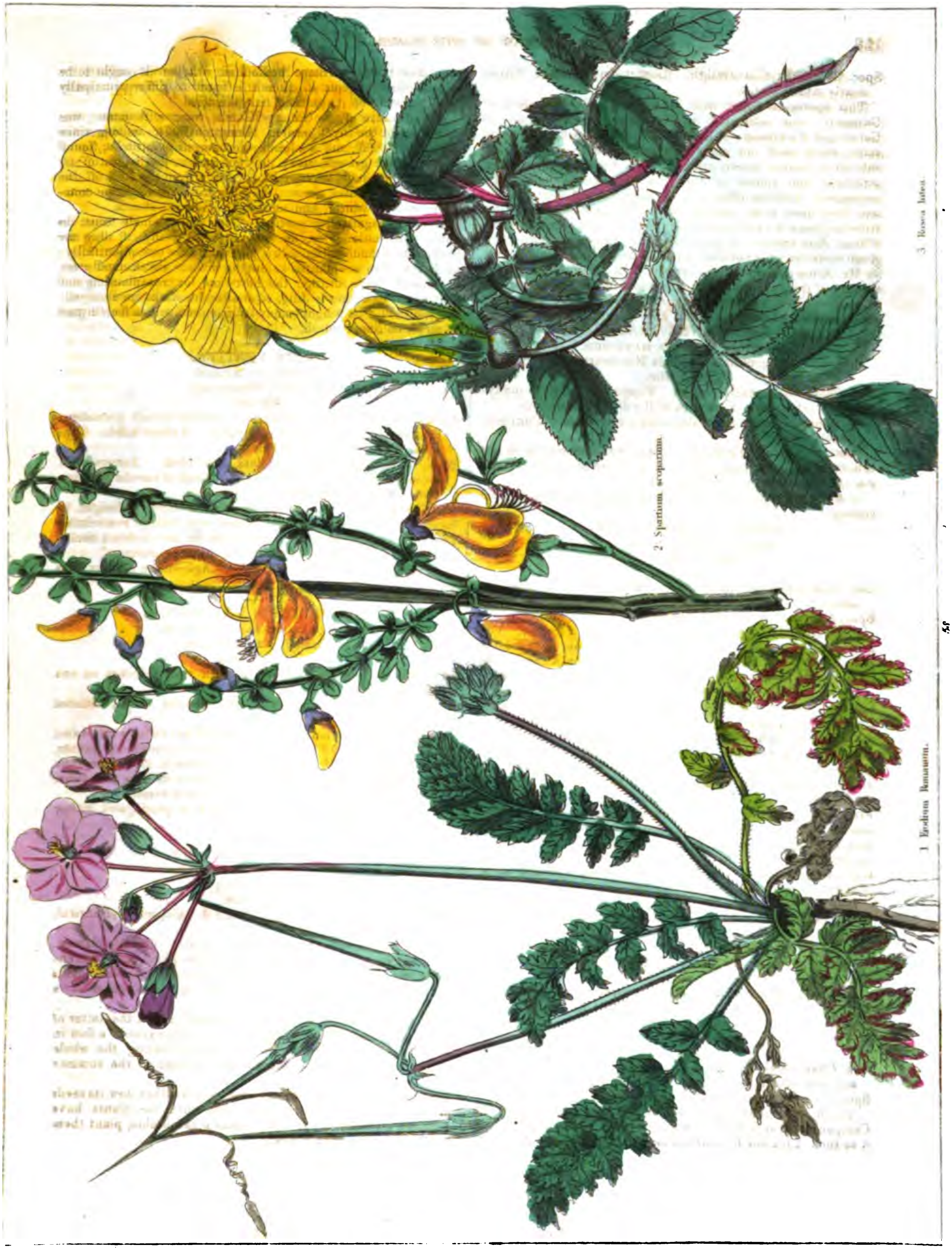
Gen. Char.—Calyx four-fid. Petals 4. Capsule cylindrical, inferior. Seed naked.

Spec. Char.—Leaves ovate, dentate, lyrate. Capsule clavate.

It has been considered as a greenhouse plant, and a perennial; we find it to be more hardy than greenhouse plants in general, and scarcely entitled to the distinction of a perennial.

It may be increased by cuttings and seeds, the latter of which are plentifully produced. It rarely exceeds a foot in height; its rose-coloured flowers expand during the whole of the day, and are produced during most of the summer months.

To guard against accidental severity of weather, sow its seeds in the spring with tender annuals; when the plants have acquired a proper age and the season is favourable, plant them out singly in the open border.



1. Erodium Romanum.

2. Spartium scoparium.

3. Rosa lutea.

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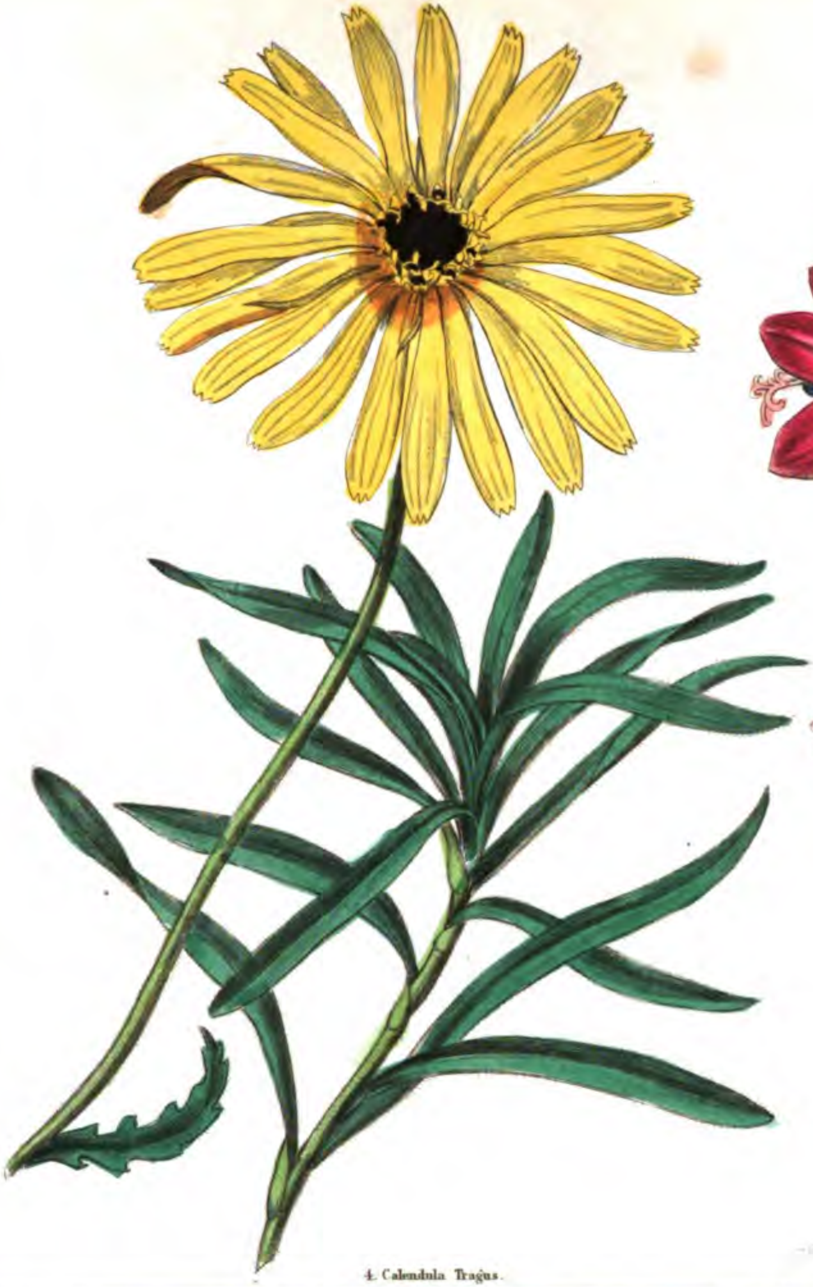
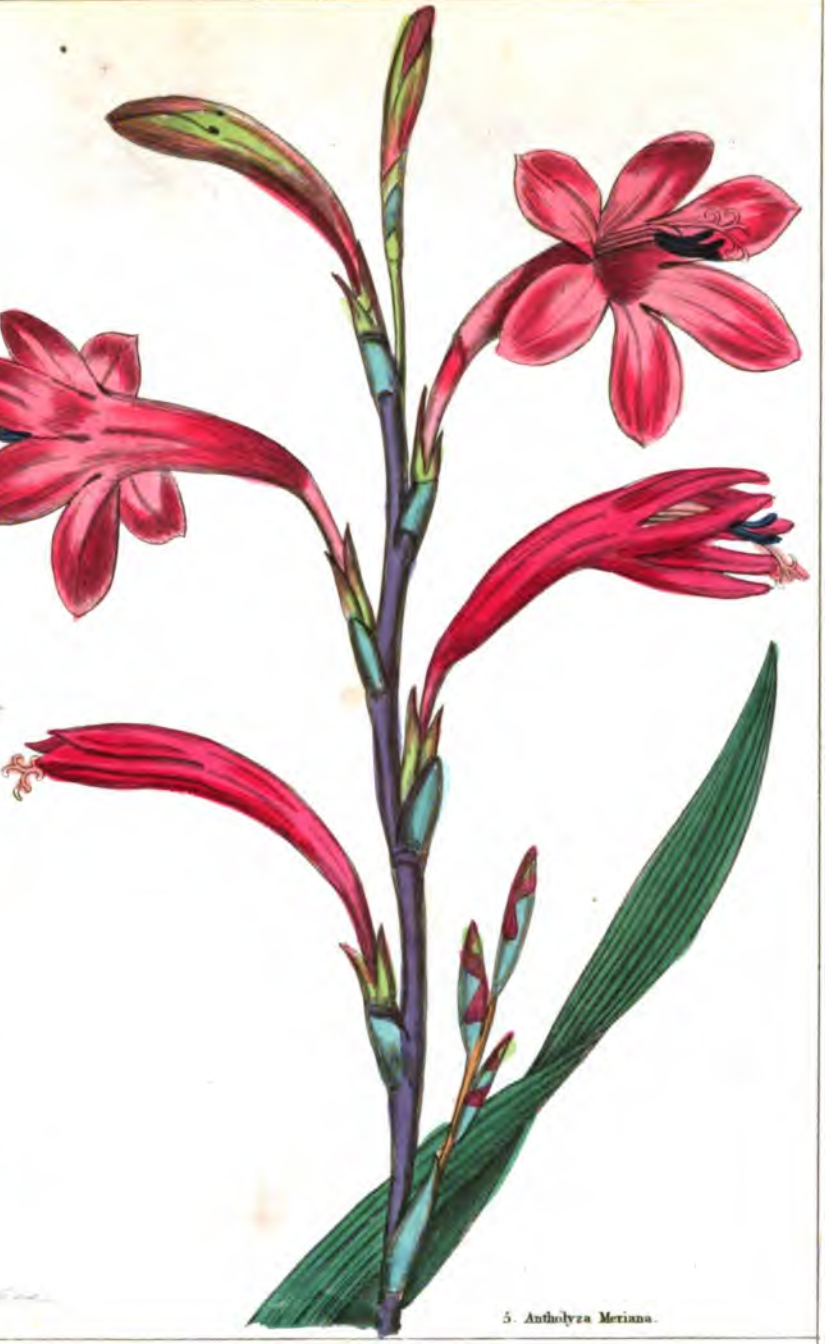


4. Calendula Tragus.



5. Antholyza Meriana.

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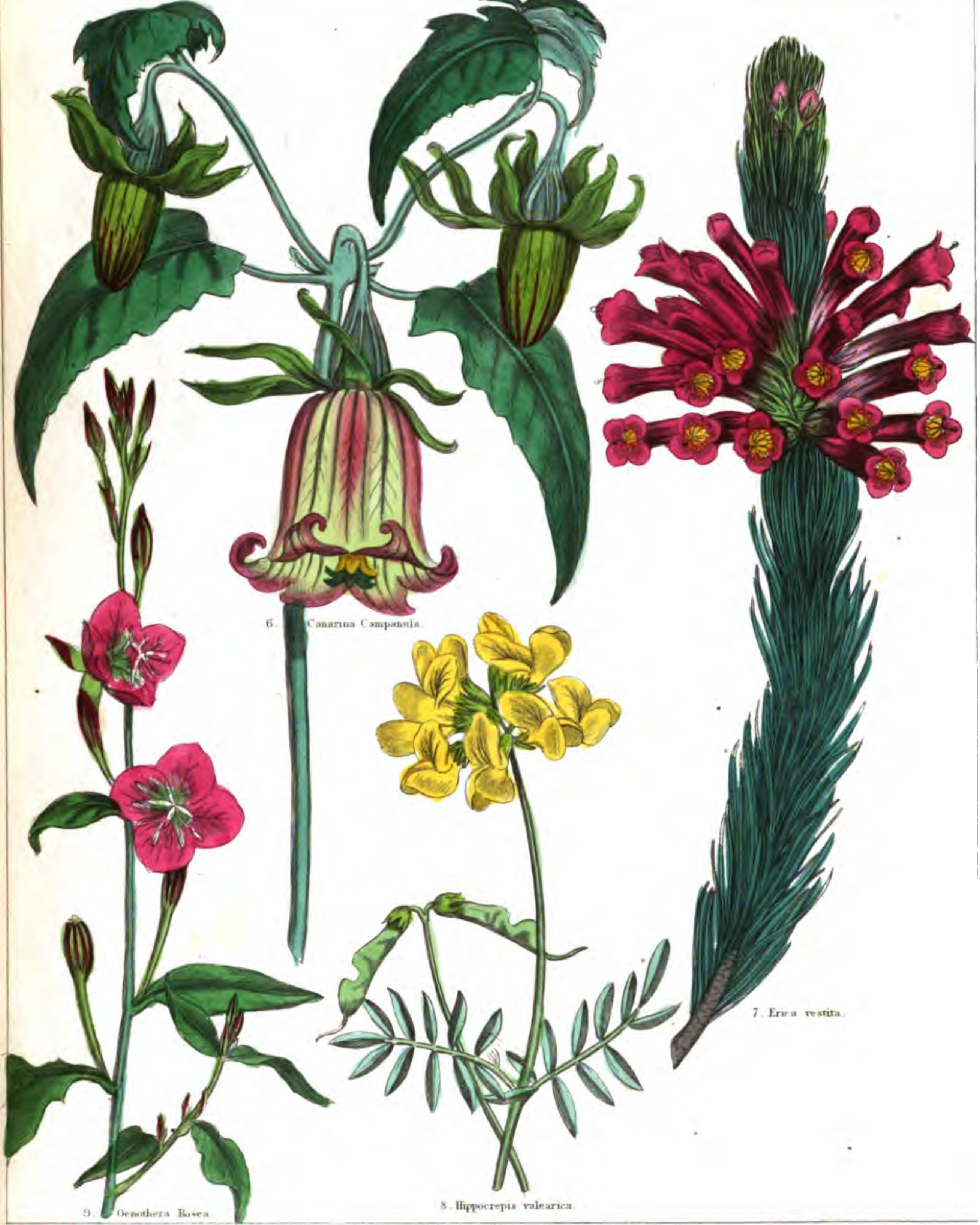
6. Canarina Campanula.
7. Erica vestita.
8. Hippocrepis valearica.
9. Oenothera Rosea.

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AND
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ON ALMONDS.

Almonds are the nuts of the *Amygdalus communis.* Two varieties are employed, differing essentially in their properties, and requiring a separate consideration. They are distinguished by the names of *sweet almonds* and *bitter almonds.*

1. Sweet Almonds.—*Amygdalæ dulces*, Officin.—*Amandes douces*, Fr.; *Süsse Mandeln*, Germ. These are the product of the variety *dulcis* of the *A. communis*, or common almond-tree. They are imported chiefly from the south of France, the Mediterranean coast of Spain, and Italy. Several varieties of the sweet almonds are known in commerce, differing in their shape or size, or in the character of their shell. The most striking distinction is into the hard-shelled and soft-shelled almonds, the latter of which are usually preferred for the table, and are considered by some as derived from a distinct species of Amygdalus. The kernels are sometimes imported deprived of the shell.

Properties and Composition.—The shape and general appearance of almonds are well known. Each kernel consists of two white cotyledons, invested by a thin yellowish-brown, longitudinally wrinkled, powdery coat, which is of a slightly astringent taste, and is easily separable from the cotyledons after immersion in hot water. Almonds are generally deprived of this coat before being used medicinally, and are then said to be *blanched.* In this state they are inodorous, and of a sweetish very agreeable taste. According to M. Boullay, the kernels contain in 100 parts, 5 parts of pellicle, 54 of fixed oil, 24 of albumen, 6 of uncrystallizable sugar, 3 of gum, 4 of fibrous matter, 3.5 of water, and 0.5 of acetic acid, including loss. When rubbed with water, they form a milky emulsion, in which the oil is suspended by the agency of the gum, sugar, and albumen. This emulsion has a close analogy with milk, not only in appearance, but also in composition. When it is allowed to stand for some time, the oil rises to the surface like thick cream; and the separation is effected more quickly by heat, alcohol, and the acids, which coagulate the albumen. In hot weather, it very quickly becomes sour, and unfit for use. The most important constituent of sweet almonds is the fixed oil, which merits a brief notice.

Oil of Almonds.—This is obtained by expression from sweet almonds, previously bruised, or ground in a mill. It is said that almonds produced in a cool climate, yield less than such as grow in warmer latitudes, and that after having been dried, they are more productive than when fresh. An equally pure oil may be procured from bitter almonds, if expressed without heat; but if heat is used, the product is apt to be contaminated with the volatile oil, containing hydrocyanic acid. The kernels are sometimes blanched before expression, and in this state yield the oil more free from colour. Sweet almonds are much more productive than the bitter. The oil of almonds is a clear colourless, or yellowish liquid, nearly inodorous, and of a bland, sweetish, agreeable taste. It remains liquid at a temperature considerably below the freezing point of water. Its sp. gravity varies from 0.917 to 0.92 at 59 deg. When properly prepared it keeps long without change.

Preservation of Almonds, signs of Quality, &c.—Almonds should have been originally well dried, and should be kept in a dry place, as they are apt to become rancid when moist. With due care, they may be kept two or three years in a sound state. They are very liable to the attacks of insects. In selecting them for medical use, care should be taken to reject those which are much shrivelled, worm-eaten, brown or yellowish internally, or of a rancid taste or smell.

Almonds are very pleasant to the taste, particularly in their recent state, and are much used as an article of diet in countries where they can be readily obtained; but unless well chewed, they are of difficult digestion, and are not wholesome when eaten in large quantities. It is said, that taken six or eight at a time, they sometimes afford relief in heart-burn. The mass which remains after the expression of the oil is employed as a cosmetic to soften the skin of the hands and face.

2. Bitter Almonds.—*Amygdalæ Amaræ*, Officin.—*Amandes Amères*, Fr.; *Bittere Mandeln*, Germ. These are derived from the variety *amara* of the *Amygdalus communis;* and are said to be brought chiefly from Morocco. They are usually smaller than the sweet almonds. When perfectly dry they are nearly inodorous; but by being rubbed with water, acquire a smell like that of the peach blossom. Their taste is bitter, like that of the peach kernel. They contain, according to Vogel, the same constituents as those found in sweet almonds; and in addition afford, when distilled with water, a peculiar volatile oil combined with hydrocyanic acid. It was formerly thought that this oil pre-existed in the almonds; but it has been rendered probable by the experiments of Robiquet and Boutron-Charlard, that it is formed by the reaction of water on a peculiar principle contained in bitter almonds; for when these are deprived of their fixed oil by expression, and afterwards submitted to the action successively of alcohol and water, they do not yield a particle of volatile oil to either of these fluids; but a peculiar substance, called *amygdalin*, is dissolved, under these circumstances, by the alcohol; and it is from this that the volatile oil is supposed to be formed by the reaction of water, when the almonds are submitted to distillation. Upon this oil and the hydrocyanic acid, associated with it, whether pre-existing in the oil, or formed by the agency of the liquors of the stomach, bitter almonds depend for their peculiar medicinal effects. *Amygdalin* is a white crystallizable substance, inodorous, of a taste at first sweetish, and afterwards bitter, unalterable in the air, soluble in alcohol, and insoluble in ether.

Volatile Oil of Bitter Almonds.—This is obtained by distillation with water from bitter almonds, previously deprived of their fixed oil. It is recommended that the mass which remains after expression, should be suspended, during the process of distillation, over the surface of the water in the boiler, so that it may be penetrated by the steam, without mixing with the water itself. The liquor which first comes over is clear, but the latter portions are milky, and hold a considerable quantity of the oil in solution, in consequence of the presence of a substance which increases the solvent power of the water. It is necessary therefore to re-distil the liquor obtained. Almost all the oil now comes over with the first portions of water, and sinks to the bottom of the vessel. The product is exceedingly small, not exceeding two ounces, or two and a half ounces, from one hundred weight of the cake. The volatile oil of bitter almonds has a yellowish colour, the peculiar odour of the kernels. and a bitter, acrid, burning taste. It is heavier than water, in which it is very slightly soluble, and dissolves freely in alcohol and ether. Upon standing, it deposits a white crystalline substance, consisting chiefly of benzoic acid, which does not exist in the oil, but is formed, as proved by Robiquet and Boutron-Charlard, by the reaction of the atmospheric oxygen. The oil contains a considerable quantity of hydrocyanic acid, which it holds with a strong affinity, as the acid is not extracted by water, and the alcoholic solution of the oil does not afford a blue precipitate with the salts of iron; but when treated with a solution of potash, or with baryta water, the oil yields the acid to the alkaline base, and loses its poisonous properties. MM. Wohler and Liebig, by mixing the oil carefully with hydrate of potassa and a solution of muriate of iron, strongly agitating the mixture, and then distilling, succeeded in obtaining it entirely free from hydrocyanic acid. In this state it is colourless and limpid, retaining its original odour, and having a burning, aromatic taste. Its specific gravity is 1.043, and its boiling point 266 deg. Fah. By exposure to the atmospheric air or oxygen gas, it is converted into benzoic acid.

The hydrocyanic acid contained in the oil of bitter almonds, is much less disposed to spontaneous decomposition than the same acid dissolved in water or alcohol. Indeed, if the oil be kept in well-stopped bottles, it will preserve its acid unchanged for several years. It might, therefore, be advantageously substituted for the officinal preparations of hydrocyanic acid, as it acts upon the system precisely in the same way, and from its greater uniformity, must be much more certain in its effects, and more easily regulated as regards the dose.

Other oils, similar in character to that of bitter almonds, may be obtained by distillation with water from the leaves of the peach and cherry-laurel, the bark of the *Prunus Padus*, and probably from many other substances possessing the same peculiar odour and taste. Among these is the kernel of the peach, which appears to possess properties nearly identical with bitter almonds, and is used for similar purposes. The odour of these oils has been erroneously ascribed to the hydrocyanic acid. It is entirely distinct from that of the acid, and exists in the oils when deprived of this principle.

RECENT DISCOVERIES IN VEGETABLE PHYSIOLOGY.

(*Concluded from p.* 126).

M. **Dutrochet** then proceeds to show, that the affinity between two heterogeneous fluids cannot explain the phenomenon in question; and he does this by the following experiment, which he had given in his original work, previous to the publication of M. Poisson's Memoir.

"If we put," says he, "the albumen of an egg into a wide glass tube, and if pure water be carefully poured upon it from above, no mixture of the two fluids will take place, and the line of demarcation which separates them will be distinctly seen. But this line of demarcation will never vary, and the albumen will undergo no augmentation of volume, however long the experiment be continued. This proves beyond a doubt that the albumen has no affinity for the water which covers it; whereas, if the same two substances are separated by a membrane, the water will pass across it, and accumulate itself on the side of the albumen, and speedily mix with it. Hence it is to another cause than to the reciprocal affinity of fluids that we must attribute this phenomenon."

With regard to the real cause of endosmose, M. Dutrochet persists in his original opinion that it is *electricity*, although its presence is not indicated by the galvanoscope. In his earliest speculations on the subject, he conceived that the electricity was generated by the approximation of the two heterogeneous fluids, between which the organized membrane interposed only an imperfect separation; but in this case the two fluids ought to have exhibited in the galvanoscope the existence of opposite electricities. He next conceived that the electricity was generated by the contact of the two fluids with the separating membrane, a state in which M. Becquerel has actually shewn that electricity is produced. Pursuing this view of the matter, he conceived that different quantities of electricity would be developed on each side of the separating membrane, and in this double electrical action he recognised the origin of the two opposite and unequal currents which passed through the membrane. This opinion, which evinces much ingenuity, was confirmed by the following experiment:—

"A tube of glass, terminating at one end with a wide mouth, closed with a plate of baked pipe-clay, about one twenty-fifth of an inch thick, was filled with a solution of gum arabic, and afterwards plunged in water, above which the empty part of the tube rose vertically. The *endosmose* took place, and the gummy fluid rose gradually in the tube. Some time afterwards the ascent of the fluid stopped, and it soon began to descend. Having removed the apparatus from the water, I perceived that the plate of clay was coated on its outside with the gummy fluid, driven from within outwards by *exosmose*. I wiped the outer surface of the plate, and replaced the apparatus in the water. From this instant the endosmose exhibited itself anew by the ascent of the fluid in the tube. Here the two opposite faces of the separating membrane, having ceased to be in immediate contact with the two different fluids, the phenomenon of endosmose no longer took place. It appears, then, that it is in this double contact that the cause of the phenomenon resides."

In the prosecution of these views, M. Dutrochet found that the double phenomenon of endosmose and exosmose was not a phenomenon of organic nature, but one of general physics, as it could be produced by the action of porous inorganic bodies. The examination of the action of such substances led our author to new results, which form the subject of a separate memoir.

In one of his works he describes an instrument for carrying on his inquiries on the subject, to which he gave the name of *endosmometer*, or an instrument for measuring the force of endosmose. This instrument he subsequently improved, and it is now constructed in the following manner:—

"Having obtained a glass terminated at one end by a large opening like that of the mouth of a trumpet, I closed this wide orifice with a piece of bladder, firmly fixed to it by means of a ligature. I now filled the wide cavity with the fluid whose power of endosmose I wished to try, and I plunged this wide part into distilled water. The tube of glass remaining empty rose vertically above the water, and carried a graduated scale. If the fluid contained in the endosmometer was such as to produce endosmose, it now rose in the tube with a velocity proportional to the force of endosmose. If the fluid, on the contrary, was not of a nature to produce endosmose, the fluid did not rise in the tube; and if, by the addition of some of the fluid, it was raised in the tube above the level of the water, it soon descended by its gravity, and filtered through the bladder. This descent of the fluid I had ascribed to the circumstance that the fluid, instead of producing endosmose had produced exosmose; but, though this is the case under certain circumstances, it is not so in the one under consideration. When, for example, we put into the endosmometer a weak solution of gum, *exosmose* will take place; the interior fluid descends in the tube, because the current of exosmose is more powerful than the current of endosmose, on account of the superior density of the external fluid; but when pure water is the external fluid, and when the fluid put into the endosmometer descends in the tube, this is not the effect of exosmose, but the simple result of mechanical filtration."

From the early experiments of our author he had concluded, that when chemical fluids, less dense than water, were employed, *endosmose* took place when the fluid in the endosmometer was *alkaline*, and *exosmose* when it was *acid*. This conclusion, however, was premature; for he afterwards found that *vinegar*, *nitric acid*, and *hydrochloric acid*, produced endosmose when placed in the endosmometer and surrounded with pure water. These results now led M. Dutrochet to examine the characters of different fluids, in reference to the production of endosmose, and the result of his observations is highly important:—

"If," says he, "we put pure water into the endosmometer, and plunge the instrument into water charged with sulphuric acid, we shall find even the water descend in the tube. This fact evidently proves, that no current of endosmose or exosmose is directed from the water towards the sulphuric acid, nor from the sulphuric acid to the water. This acid, however, from its having a greater density than water, ought to have produced endosmose when in the endosmometer. As it produces, however, no effect, we may conclude that its chemical qualities render it completely incapable of producing either endosmose or exosmose. We find, also, that it is an enemy to this double action; for it tends to extinguish it where it already exists. Thus, if we mix a small quantity of sulphuric acid with a solution of gum, and introduce it into the endosmometer, this fluid will not produce endosmose, though the gummy solution used alone produces this effect energetically. The mixture of the two descends gradually in the tube of the endosmometer. When the quantity of sulphuric acid is very small, a weak force of endosmose still remains; for the acid solution, which at first fell, resumes a slight ascending motion, whilst the continued immersion of the bladder in the water has deprived the gummy solution of a part of the acid which it originally borrowed. This very important fact proves that there are inactive fluids, in reference to the power of producing endosmose, and that these fluids can communicate their inactive quality to fluids which in this respect have opposite qualities. All putrid animal fluids are in this respect inactive; for when placed in the endosmometer they descend in the tube, notwithstanding their superior density to water. We may then establish it as a general fact, that all active fluids, miscible with water, whether organic or chemical fluids, comport themselves like fluids more dense than water, when they are separated from the latter by a permeable membrane: that is, that they are all agents producing endosmose; for it is never towards the side occupied by the water that the strongest of the two currents which constitute endosmose and exosmose is directed. Hence, no active fluid, put in communication with water, is an agent producing exosmose. Whenever we see a fluid descend in the tube of the endosmometer whose bladder is immersed in pure water, we may thence conclude that the interior fluid is inactive; its descent in the tube being the result of its filtration by the action of gravity."

Having thus found that fluids may be divided into two great classes, *active* and *inactive*, in reference to the production of endosmose and exosmose, our author proceeds to examine if solids have similar properties. We have already described his experiments with the endosmometer, by which he determined that endosmose was produced by the action of the voltaic pile, when pure water was both within and without the endosmometer. In this case the mouth of the instrument was closed with a piece of bladder. He then tried to produce the same effect, when porous plates of freestone and carbonate of lime were substituted in place of the bladder, but the action of the pile produced, in this case, no endosmose: with plates of baked pipe-clay, however, a very different effect was produced.

"I closed," says he, "the mouth of the endosmometer with a plate of clay three-eighths of an inch thick; I put distilled water into the endosmometer, which was itself immersed in distilled water, and I afterwards put the interior water in communication with the negative conjunctive wire of the pile, the exterior water being in contact with the positive conjunctive wire. The transmission of the water across the plate of clay became very rapid. The interior water soon reached the level of the exterior water; it entered the tube and rose in it rapidly. This ascent of the water continued while the action of the pile lasted."

From this experiment M. Dutrochet concludes, that porous aluminous solids produce endosmose like organic membranes under the influence of an electric current, directed from the positive to the negative pole of the pile. His next object was to ascertain, if different mineral solids produce endosmose by the contact of their opposite faces with homogeneous liquids. He tried the following substances:—

Substances employed.	*Thickness.*
Plate of tender freestone	1-6th of an inch.
——— porous carbonate of lime .	⅓ ———
——— ———	much thinner.
——— unbaked calcareous sulphate of lime	1-6th ———
——— crystallized sulphate of lime	very thin.

But in none of these cases was there the least appearance of endosmose; a circumstance which he ascribed to the too great thickness of his plates, which were all necessarily thicker than organic membranes. He therefore tried to obtain thinner plates, and he succeeded by giving slate a slight degree of calcination, to separate it into fine leaves. By this means he obtained the following effects:—

Substances employed.	*Thickness.*	*Effects.*
Slate .	1-50th of an inch .	Slight endosmose.
Baked white clay	1-25th —— .	Powerful endosmose.

This success induced our author to try greater thicknesses, as follows:—

White baked clay	½ of an inch.	Considerable endosmose.
Ditto ditto . .	⅜ ——— .	Weak endosmose.

Hence it appears, that it depends upon the chemical nature of the porous plates, whether they shall produce endosmose or not. The aluminous solids are therefore *active solids;* and those with a *siliceous* and a *calcareous* base, which do not produce endosmose, are *inactive solids.*

To the science of vegetable physiology the discoveries of M. Dutrochet have a more immediate application. They form, indeed, an epoch in its history: as from a new goal, the science starts with powerful instruments of research, and with fresh prospects of success. The discovery of endosmose, and of the cause of the ascent of sap in plants, is, to vegetable physiology, what the establishment of the law of gravity was to astronomy. While it binds together the scattered elements of the science, it lays the foundation of an inductive superstructure, which can be reared only by men of varied talent, who combine the accomplishments of the chemist and the natural philosopher with the knowledge and patient observation of the botanist.

To have discovered the fact and the operation of endosmose must have immortalized any philosopher; but M. Dutrochet has placed his reputation on a still more secure basis, by discovering its origin. That electricity is the direct cause of this singular effect cannot now be doubted; and we are sanguine in the hope that means may be discovered of promoting and modifying vegetation by the stimulus of the electric fluid, obtained either by artificial means, or drawn from the atmosphere. The opinions of the Abbé Bertholon, on this subject, are extremely remarkable, and we cannot resist the temptation of laying them before our readers—not as being, in the least degree, an anticipation of the discoveries of M. Dutrochet—but, in so far as they are correct, as a confirmation of the general principle.

"By means," says he, "of the electro-vegetometer, we may be able at our pleasure to accumulate this wonderful fluid, however diffused in the upper regions, and conduct it to the earth's surface in those seasons when it is either scantily supplied, or its quantity is insufficient for vegetation; for though it may be, in some degree, sufficient, yet it can never produce the effects of a multiplied and highly increased vegetation. So that we shall, by these means, have an excellent vegetable manure or nourishment brought down, as it were, from heaven, at an easy expense; for after the construction of this instrument, it will cost nothing to maintain it. It will, besides, be the most efficacious that can be employed, as no other substance is so active, penetrating, or conducive to the germination, growth, multiplication, or reproduction of vegetables. This heavenly manure is that which nature employs over the whole habitable earth, not excepting even those regions which are esteemed barren, but which, however, are often fecundated by those agents which nature knows so well to employ to the most useful purposes. Perhaps there was nothing wanting to bring to a completion the useful discoveries that have been made in electricity, but to show the advantages of the art of employing electricity as a manure, and, consequently, that all the effects which we have already mentioned, depend on electricity alone, and that all these effects—viz. acceleration in the germination, the growth, and production of leaves, flowers, fruit, and their multiplications, &c., will be produced even at a time when secondary causes are unfavourable to it.

"By multiplying these instruments, which are provided at little expense (since iron rods of the thickness of the finger, and even less, are sufficient for the purpose), we multiply their beneficial effects, and extend their use *ad infinitum*.

"This apparatus having been raised with care in the middle of a garden, the happiest effects were perceived—viz. different plants, herbs, and fruits, in greater forwardness than usual, were multiplied, and of superior quality. These facts are analogous to an observation which I have often made—that plants grow fast and are most vigorous near thunder-rods, where their situation favours their development. They likewise serve to explain why vegetation is so vigorous in lofty forests, and where the trees raise their heads far from the surface of the earth, so that they seek, as it were, the electric fluid at a far greater height than plants less elevated, while the sharp extremities of their leaves, boughs, and branches, serve as so many points, granted them by the munificent hand of Nature, to draw down from the atmosphere that electric fluid which is so powerful an agent in forwarding vegetation, and in promoting the different functions of plants."

It would have been very desirable that the Abbé Bertholon had mentioned the specific facts upon which he has founded these very vague and general, though, at the same time, curious views. That they are not entirely speculative, is proved by the facts previously discovered by Mr. Maimbray of Edinburgh, and the Abbé Nollet. The first of these experimentalists found that two myrtle trees, electrified during the month of October, 1746, put forth small branches and blossomed much earlier that other shrubs that were not electrified; and the Abbé Nollet having sowed seeds in two pots filled with the same mould, and kept in the same place, found that the seeds in one of the pots which had been electrified two or three hours a day for fifteen days, exhibited sprouts two or three days sooner than those in the unelectrified pots, and threw out larger shoots, and a greater number of them, in a given time.

Having thus given as distinct an account as we can of the great discovery of endosmose, which the Royal Academy of Sciences has honoured with a gold medal, we cannot take leave of M. Dutrochet without expressing our anxious hope that we shall soon have an opportunity of announcing the successful continuation of his labours, and that he will not allow the subject to pass into other hands, till he has brought within the dominion of his general principles the leading phenomena of vegetable life.

The science of vegetable physiology is now arrived at a point where great discoveries may be soon expected. The extraordinary fact discovered by Dr. Brewster, that innumerable crystals of silex, possessing distinctly the property of double refraction, form an essential part of the siliceous grasses, and that all the separate crystals have their axes arranged, not in parallel lines, but so as to form geometrical figures by the light which they depolarise, points out a new relation between the laws which govern the crystallisation of inanimate matter, and those which regulate the operations of vegetable life.

The recent observations, too, of our distinguished countryman, Mr. Robert Brown, respecting what appear to be the active molecules of bodies, whether of mineral or vegetable origin, promise a rich harvest of discovery. He has announced the singular fact, that active spherical molecules exist in the grain and pollen of most plants along with its proper particles, and that these molecules have a spontaneous or inherent motion when immersed in water. Even when the pollen has been immersed in weak spirits for nearly a year, the apparent vitality of the particles still exists; nay, it remains in plants which have been dead for more than a century, and survives even the most intense heat to which animal and vegetable fibre can be exposed. These primary molecules exist in almost all minerals, and even in pounded glass. They occur, not only in their simple state, but also in a compound form. Oval particles, equal to about two molecules, and supposed to be primary combinations of these, often appeared, and were in general more vivid in their movements than the simple molecules, revolving most commonly on their longer axes, and frequently exhibiting a flattened form. Other compound molecules were seen resembling short fibres, and somewhat moniliform, and having their transverse diameter equal to that of the primary molecule. These fibrils, whether composed of two or three molecules, or of four or five, were generally in motion. This motion was, at least, as vivid as that of the simple molecules, and might be said to be somewhat vermicular. Whatever be the substance in which they occur, Mr. Brown considers the simple molecules to be of uniform size, and from various measurements, he regards them as about the *twenty-thousandth* part of an inch in diameter.

The same curious subject is occupying the attention of the French botanists; and M. Adolphe Brongnairt has published the results of some of his observations, in his "Recherches sur la Génération et le Developpement de l'Embryon dans les Végétaux Phanérogames," which was read before the Academy of Sciences, and has been published in the "Annales des Sciences Naturelles."

From the talents and activity of these two botanists, we may expect with confidence some highly important results, and we trust we shall soon have an opportunity of again calling the attention of our readers to so curious a subject.

In consequence of observations which we have ourselves made on the statements of these microscopic bodies, we have no doubt that they are all occasioned by chemical and physical changes in the molecules themselves, and by other illusory motions, which it is difficult to exclude in the employment of high magnifying powers.

ON THE ACONITUM.

The plants composing this genus are perennial and herbaceous, with stems from two to six feet in height, furnished with digitate or palmate leaves, terminating in spike-like racemes, or panicles, of conspicuous yellow or violet-coloured flowers. The limits of the different species do not appear to be well defined, some botanists considering as distinct plants what others admit only to be varieties. Hence has arisen a confusion of nomenclature which is often perplexing, and which sometimes renders it impossible to decide to what species authors refer in their accounts of the properties of the Aconite. There has even been considerable uncertainty as to the particular species which should be considered officinal. Storck, who introduced the medicine into notice, speaks of the plant employed by him as the *A. Napellus*, and hence this species came to be generally introduced into the officinal catalogues. But the figure of Storck's plant was not found to corespond with the *A. Napellus* of Linn., but with another species, described by Willdenow under the name of *A. Neomontanum*, and considered, at present, as a variety of the *A. Cammarum* of Linn., or the *A. Paniculatum* of De Candolle. The latter species has, therefore, of late, been generally considered as the plant used by Storck. But Storck speaks of the plant with which he experimented as possessing an extraordinary degree of acrimony, producing when applied to the tongue, even in the dried state, a very severe and long-continued burning, attended with a flow of saliva. Now, we are assured by Geiger, in his Manual of Pharmacy, that he has always found the *A. Neomontonum*, as cultivated in the gardens, comparatively mild to the taste; and the same observation was made by Buckner. That this want of acrimony was not owing to the domestication of the plant, was inferred from the fact that the *A. Napellus* growing alongside of it had a very burning taste; and this difference between the two species was found to be constant in every situation in which they were examined. Hence it is conjectured by Geiger, with whom Hayne concurs, that the figure in Storck's work was probably drawn from a different plant from that which he actually used. De Candolle considers the variety *Storckianum* of his *A. Paniculatum*, as the plant employed by that celebrated physician. But more weight has, perhaps, been attached to this question than it really deserves. Most of the Aconites have similar medical virtues, which may be considered, in the different species, as proportionate to their respective acrimony; and it is of little consequence which was the particular plant that formed the subjects of Storck's experiments. The leaves of various species are, in fact, indiscriminately collected and kept in the shops; and the value of any particular specimen must be judged of, not by the species from which it was derived, but from the degree in which it possesses the peculiar sensible properties of the medicine. If, however, any one species is to be selected as officinal, that should be preferred which possesses, under all circumstances, whether wild or cultivated, the most acrimony; and Geiger states, that the *A. Napellus* of Linn. is superior, in this respect, to all those tried by himself. In the Paris Codex, the *A. Anthora*, *A. Cammarum*, and *A. Napellus*, are recognised as officinal; by the London and Edinburgh colleges, the *A. Napellus*; by the Dublin College, the *A. Paniculatum* of De Candolle; and in the U. S Pharmacopœia, the *A. Neomontanum*. We shall describe particularly only the *A. Napellus*.

A. napellus, Linn. This is a perennial plant, with a turnip-shaped or fusiform root, which is externally brown, internally whitish and fleshy, and from its shape has given rise to the name Napellus, which signifies a little turnip. After the plant has shot into stem, there are usually two roots, one of which supports the plant, and is of a dark-brown colour, the other, standing by its side, is similar in form, but younger, and of a light-yellowish-brown colour, and sends up the stem of the following year. The stem is herbaceous, erect, round, leafy, usually simple, and from two to four or even six feet in height. The leaves are alternate, petiolate, divided almost to the footstalk, from two to four inches in diameter, deep green on their upper surface, light green beneath, somewhat rigid, and more or less smooth and shining on both sides. Those on the lower part of the stem have long footstalks, and five or seven divisions; the upper, short footstalks, and three or five divisions. The divisions are narrow at their base, but widen in the form of a wedge towards their summit, where they usually present three lobes, of which the middle is the longest, and all are cleft or toothed with linear, or linear-lanceolate and pointed laciniæ, or teeth. The flowers are of a dark violet-blue colour, large and beautiful, and are borne at the summit of the stem upon a thick, simple, straight, erect, spike-like raceme, beneath which several smaller racemes sometimes rise from the axils of the upper leaves. They stand upon short, somewhat erect peduncles, which are furnished with two short calycinal stipules, within a few lines of the flower. There is no calyx. The petals are five; the upper helmet-shaped and beaked, nearly hemispherical, open or closed; the two lateral, roundish and internally hairy; the two lower oblong-oval. They inclose two pedicelled nectaries, of which the spur is capitate, and the lip bifid and revolute. The capsules are from three to five in number, joined at the base, diverging at the summits, and inclosing several small, brown, inversely pyramidal seeds.

This species of Aconitum is a native of Europe, growing in the mountains, forests, and meadows of France, Switzerland, and Germany, and found also in Siberia. It is cultivated as an ornamental plant, but, according to Ray and others, it loses much of its virulency when transplanted from its native mountains. Geiger, however, found it very acrid as growing in the gardens, and thinks that the accounts of the different powers of the wild and cultivated plant may be attributed to diversity in the species examined. The whole plant is acrid and poisonous; but the leaves are the part chiefly used.

Little need be said of the other species of Aconitum. 1. The *A. anthora* is remarkable for its yellow flowers. Its root, which has a not unpleasant odour and a bitterish acrid, somewhat sweetish taste, was formerly esteemed an antidote to the *thora*, whence the species derived its name, though it does not appear to be determined, whether the poisonous vegetable referred to was the *Aconitum napellus*, or *Ranunculus thora*, or some other plant. But the fact appears to be, that the *A. anthora* possesses similar properties with the other species of Aconitum, though in a less degree. According to Linnæus, it is poisonous, vermifuge, and cathartic; and it has been used for the expulsion of worms. 2. The *A. cammarum* of Linn. has attracted attention under the supposition that it was the plant used by Storck. It possesses similar properties with the A. napellus, though probably in an inferior degree. The *A. neomontanum* is a variety of this species, which includes also the *A. paniculatum* of De Candolle. 3. The *A. lycoctonum* has the peculiar acrid, narcotic, and poisonous properties of the genus. The root is said to be peculiarly poisonous. The plant derived its name from the circumstance that it was formerly used, like others of the genus, to destroy wolves. According to Dr. Martius, the root is used in Russia as a preservative against hydrophobia, being applied to the wound in the form of powder. The leaves of the *A. lycoctonum* are said to be frequently substituted for those of the *A. napellus*. 4. Dr. Wallich has recently published a description of the *A. ferox*, a native of Nepaul, the root of which is said to be extremely deleterious, and to have been used by the natives in time of war, for poisoning their weapons, and the springs of their country, when invaded by an enemy.

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ON THE ALOE.

The plants of this genus, amounting, according to Lindley's enumeration in the Encyclopædia of Plants, to ninety-nine in number, are perennial, evergreen succulents, having, in some instances, the character of trees or shrubs, but in general presenting an herbaceous aspect. Some are furnished with a stem, which is usually round and simple; others are stemless, sending up their leaves and flower-stalks directly from the root. The leaves are thick, fleshy, succulent, sometimes unarmed, sometimes thorny on the margin, smooth or warty, and of a green colour, occasionally painted, or diversified with spots. The flowers, which are often showy and beautiful, are supported, in the form of spikes or racemes, upon usually long, sometimes branching, scapes or peduncles. All the species, upon being wounded, yield a juice, which is generally bitter and purgative, and, in a concrete state, constitutes the drug known by the name of aloes. From which of the species the aloes of commerce is actually derived, has not been determined with entire precision. It is probable that the *A. soccotrina*, *A. spicata*, and *A. vulgaris*, yield most of the aloes at present employed; and to these, accordingly, we shall chiefly confine our attention, merely noticing others which have been mentioned by writers as contributing to furnish the medicine. The aloe plants are all natives of warm climates, and most of them of the Cape of Good Hope. They prefer a light sandy soil.

1. *A. soccotrina.* This species is shrubby, with a stem three or four feet high, bearing at its summit numerous crowded, embracing leaves, disposed without regular order, and a foot or eighteen inches long. Sometimes the stem branches into two, three, or four of these leafy heads. The flowers, which are of considerable size and of a beautiful scarlet colour, are disposed in the form of a close, cylindrical raceme, at the end of an erect peduncle, which rises eighteen inches or two feet from the top of the stem. The plant is a native of the island of Socotora, of the neighbouring parts of Arabia and Africa, and of the Cape of Good Hope. It is probably the source, at least in part, of the variety of aloes called Socotrine.

2. *A spicata.* The stem of the spiked aloe is three or four feet high, about as thick as a man's arm, and leafy at the summit. The leaves, which are disposed in a somewhat verticillate order, are broad at the base, gradually narrowing to a point, about two feet long, channelled, acute, and with remote teeth. The flowers are in very close spikes, which spread horizontally. The corolla is bell-form, almost six-petalled, with the three inner segments unconnected, ovate, obtuse, and of a white colour marked with three green lines, the three outer connected with the others at their base, narrower, and less concave. The species is distinguishable by the spikes and by the form of the flowers. It was first described by Thunberg, who found it growing at the Cape of Good Hope. It is said to be especially abundant in the district of Zwellendam, near Mossel Bay, where great quantities of aloes are collected. The best Cape aloes is derived from this species. The statement made by some writers that it affords the Socotrine aloes, is probably incorrect; as this does not come from the Cape of Good Hope, and is wholly different in appearance from the drug obtained from that part of Africa.

3. *A. vulgaris.* In the common aloe, the stem is ligneous, simple, about four inches high, and concealed by the leaves, which embrace it at their base. The leaves are numerous, lanceolate, three or four inches broad at the base, a foot or eighteen inches long, turned upwards from the middle, flat on the upper surface, convex beneath, with hard spines at the edges, and without spots. The flower-stalk rises from the midst of the leaves, and divides into three, four, or five branches, which bear yellow flowers at their summit, disposed in oval cylindrical spikes. The corolla is cylindrical and full of a sweet juice. This species grows wild in Syria, Greece, and Spain, and has been introduced into the West Indies. It yields a variety of hepatic aloes, sometimes called Barbadoes aloes, from the island where it has been most abundantly produced. The poorest soils, unfit for sugar or other valuable crops, are selected for its cultivation.

In addition to the above-mentioned species, the *A. arborescens*, *A. commelini*, *A. dichotoma*, *A. lingua* (*A. linguæformis*, Linn. Suppl.), and *A. purpurascens*, have been particularized as contributing to furnish the aloes of commerce. They are all natives of the Cape of Good Hope. The *A. arborescens* and *A. purpurascens*, which, as well as the *A. Socotrina* and *A. vulgaris*, above described, were included in the *A. perfoliata* of Linnæus, are said to be cultivated for the sake of their product in the West Indies. The *A. arborescens* is one of the largest species, with a stem ten or twelve feet high, and having in some measure the appearance of a tree.

In the countries where the aloe plants grow spontaneously, cordage and a coarse kind of cloth are sometimes manufactured out of the fibres of the leaves; and the prickly species are used for hedges.

Commercial History and Varieties.—Three varieties of aloes are known in the markets of this country—the *Cape*, the *Socotrine*, and the *hepatic*—to which may be added the *caballine*, *fetid*, or *horse* aloes, which, though not at present employed, is described in most works upon Materia Medica. Each of these merits a distinct notice.

1. Cape Aloes.—This variety, which derives its name from the Cape of Good Hope, where it is produced, is by far the most abundant, and, when of good quality, is quite equal in medicinal power to the Socotrine, with which in fact it is confounded by many writers, though wholly distinct in its appearance. By the German writers it is called *aloe lucida*, or *shining aloes*, from the brilliancy of its surface. The name is very appropriate, though it belonged previously to another variety, produced by spontaneous exudation and inspissation upon the leaves of the plant, and existing in the form of tears. This, however, is at present unknown in commerce. Cape aloes is supposed to be derived chiefly from the *Aloe spicata*. Thunberg states, that the Hottentots cut off the leaves, and arrange them so that the lowest serves as a gutter to convey the juice into a calabash, in which it is afterwards inspissated, by being brought near the fire. But this process is too slow to afford the aloes at so cheap a rate as it is now found in the market. The plan said to be followed at Zwellendam, is to express the juice from the leaves, previously cut in pieces, and to inspissate it in boilers, over the fire. When of a proper consistence, it is introduced into chests or casks, and sent into the market.

As found in the shops, it is in irregular, angular fragments, of various sizes. It has a very dark olive colour, approaching to black, and when freshly broken presents a smooth, shining, glossy surface, which is one of its most distinguishing characters. When held up to the light, it usually appears somewhat translucent at the edges. The small fragments also are translucent, and have a tinge of yellow or red, mixed with the deep olive of the opaque mass. A similar tinge is sometimes observable in the larger pieces, especially when they are penetrated with small cracks, or fissures. The powder is of a fine greenish yellow colour, and being generally more or less sprinkled over the surface of the pieces, gives them, as found in the shops, a yellowish, somewhat dusty appearance externally. Cape aloes, when perfectly hard, is very brittle, and easily pulverizable, breaking with a smooth, glassy fracture, with sharp edges. In hot weather, it is apt to be somewhat soft and tenacious; and the interior of the pieces is occasionally more or less so even in winter; but by long keeping and exposure, it becomes perfectly dry, and remains hard and brittle in the middle of summer. Its odour is strong and disagreeble, but not nauseous, and has not the slightest mixture of the aromatic.

2. Socotrine Aloes.—This received its name from the island of Socotora, in the Straits of Babelmandel, in which it has been produced from a very early period, being mentioned in the writings of Avicenna, who speaks of it as superior to the other kinds then in use. We are told, however, by Ainslie, that the greater part of the aloes sold as the Socotrine, is prepared in the kingdom of Melinda, on the eastern coast of Africa. The species of Aloe which yields it, is not certainly known. Ainslie says that it is from the same species as the Cape aloes; but the two varieties differ too much in appearance and sensible properties, to admit the supposition of an identity of origin, unless upon strong proof; and none such has been adduced. There does not appear to be any good reason for depriving the *Aloe Soccotrina* of the credit which it formerly enjoyed, of producing this highly esteemed variety of aloes. Dr. A. T. Thomson tells us, in the London Dispensatory, upon what authority is not stated, that in the process of preparing aloes, in the island of Socotora, the juice, having been expressed from the leaves previously cut in pieces, is allowed to rest for forty-eight hours, in order that the feculent matter may subside, and is then poured off into flat dishes, and evaporated in the sun. When sufficiently hard, it is placed in skins, and exported. A portion reaches Europe by the route of the Red Sea; another portion is sent to Bombay, and other Indian ports, and thence shipped to different parts of the world.

But the name of Socotrine aloes is not confined to the product of this island exclusively; it is also applied to parcels of the drug from other sources, prepared with unusual care, and resembling it in quality. Thus in the West Indies, according to Dr. Browne and Mr. Millington, the juice which flows out from the leaves when cut off from the plant, is sometimes inspissated by exposure to the sun in shallow vessels, or bladders hung up in the open air, and in this state is called *Socotrine* aloes; while that prepared by boiling the juice, is called *hepatic*. M. Jussieu witnessed at Morviedro, in Spain, the preparation of three varieties of aloes, from the *A. vulgaris*—the *Socotrine*, by incision, and spontaneous evaporation, the *hepatic* by expression, and the *caballine* by still stronger pressure. Even in the East, whence the genuine Socotrine aloes is procured, the inferior variety denominated hepatic, is also prepared, probably from the same plant; and it may be considered that these terms are applicable rather to different qualities of the drug than to distinct products obtained from wholly different sources.

Socotrine aloes is in pieces of a yellowish or reddish brown colour, which becomes much darker by exposure to the air, but is always wholly different from that of the first variety. Its surface is somewhat shining, and its fracture usually smooth and conchoidal, with rather sharp and semi-transparent edges. The colour of its powder is a bright golden yellow. It has a peculiar, not unpleasant odour; and a taste, which though bitter and disagreeable, is accompanied with an aromatic flavour. Though hard and pulverulent in cool weather, it is somewhat tenacious in summer, and softens with the heat of the hand.

3. Hepatic Aloes.—Hepatic aloes is prepared in the West Indies and Spain, and is also brought from the East Indies. According to Ainslie, it is not produced in India, but is taken thither from Yemen, in Arabia. It is probably derived from the same source as the Socotrine, but prepared with less care, or by a different process. In Spain it is procured from the *Aloe vulgaris*. That obtained from the West Indies, which is most abundant in the markets of Europe, is sometimes called *Barbadoes aloes*, from the island in which it is most largely produced. Both in Barbadoes and Jamaica, the aloe plant is cultivated to a considerable extent in the poorer soils. The species which yields most of the aloes from the West Indies, is said to be the *A. vulgaris*, although the *A. arborescens*, and *A. purpurascens*, and perhaps some others, are also cultivated. The process for preparing the drug, as described by Dr. Browne and Mr. Millington, consists in cutting off the leaves close to the stem, allowing them to drain in tubs, and, when a sufficient quantity of the juice is collected, evaporating it in large iron or copper boilers over a regular fire. Dr. Wright, in his account of the medical plants growing in Jamaica, represents the process somewhat differently. According to this author, the plant is pulled up by the roots, cut into pieces, placed in small hand-baskets or nets, and then introduced into large iron boilers with water, where it is boiled for ten minutes. At the end of this time it is removed, and its place supplied by fresh parcels, till the liquor becomes strong and black. This is then allowed to rest till it deposits its feculent parts, when the clear liquor is poured off, and evaporated in large iron vessels, rapidly at first, but more carefully towards the end of the process, in order to prevent the aloes from being burnt. When of the consistence of honey, it is poured into gourds or calabashes, and allowed to harden. It is probable that both these processes are employed; but the first would yield a better product. The best aloes is brought to Europe from the West Indies in calabashes, and the inferior sorts in casks.

Hepatic aloes, like the Socotrine, is of a reddish-brown colour, but is darker and less glossy. Its name originated in the resemblance of its colour to that of the liver. Its odour is disagreeable and nauseous, differing wholly from that of the Cape aloes, and without the aromatic flavour of the Socotrine. The taste is nauseous and intensely bitter. The fracture is not so smooth, nor the edges so sharp and transparent as in the two first varieties. It softens in the hand, and becomes adhesive. The powder is of a dull reddish-yellow, or olive-yellow colour.

4. Caballine Aloes.—The *caballine* or *horse* aloes, sometimes called *fetid aloes*, from its odour, is a very impure variety of the drug, procured from the dregs of the juice deposited during the preparation of the more valuable varieties. It is black, heavy, opaque, and of an offensive odour, and, in consequence of the sand and other impurities which it contains, breaks with a rough fracture. It is employed only for horses, whence it derived its name. In this country it is scarcely known.

ON ABIES.

This genus was separated from the Pinus of Linn., and is at present recognized by perhaps the majority of botanists as distinct; although by many its species continue to be associated with the pines, to which they are closely allied in botanical character. The firs and spruces are beautiful evergreen trees, with their branches usually verticillate aud horizontal, and assuming, when allowed to expand freely, a pyramidal form. Their leaves differ from those of the pines, in being solitary, and distinct at their base. Their male aments, moreover, are simple instead of being branched, and the scales of the cone are flattish, thin, and not swelled at their summit.

1. *A. balsamea.*—*A. balsamifera*, Michaux.—*Pinus balsamea*, Linn.—*American silver fir. Fir balsam. Balsam of Gilead.* —*Pin baumier*, Fr. *Balsamtanne*, Germ. *Sp. Ch.* "Leaves, solitary, flat, emarginate, subpectinate, suberect above. Scales of the cone in flower acuminate, reflexed."—*Lindley.* This tree is a native of North America, growing in Canada, Nova Scotia, New Brunswick, and the northern parts of New England, and extending along the Allegbany ridges as far southward as North Carolina. It is of middling size, seldom exceeding 40 feet in height, with a trunk a foot in diameter near the base. The branches are numerous, and thickly covered with leaves, which are from six to eight lines long, narrow, rigid, flat, of a bright green colour on their upper surface, and a silvery whiteness beneath. The cones are nearly cylindrical, four or five inches long by an inch in diameter, erect, and often covered with a resinous exudation which gives them a shining appearance. This tree yields the *Canada turpentine*, known more commonly by the erroneous name of *Canada balsam*, and occasionally called *balsam of fir*.

2. *A. canadensis.*—*Pinus canadensis*, Pursh.—*Hemlock spruce. Sp. Ch.* "Leaves solitary, flat, toothletted, somewhat distichous. Cones ovate, terminal, scarcely longer than the leaf."—*Lindley.* This species of Abies is indigenous, abounding in Canada, New Brunswick, Nova Scotia, and New England, and flourishing also in the more elevated districts of the middle States of America. It attains a height of seventy or eighty feet, with a trunk six or eight feet in circumference, and of nearly uniform dimensions for two-thirds of its length. When young, it has a beautiful appearance, from the symmetrical arrangement of its close horizontal branches, and the density of its foliage; but, as it becomes older and more brittle, the same causes tend to mutilate and disfigure it, by the frequent breaking of the branches under the weight of snow with which they become loaded in winter. The leaves are six or eight lines long, flat, numerous, and irregularly disposed in two rows. The cones, which are rather longer than the leaves, are ovate, and hang downwards at the ends of the branches. The bark of the hemlock spruce contains much tannin, and is employed as a substitute for that of the oak in the preparation of leather; but this tree is interesting chiefly as the source of the *hemlock pitch*, or, as it is commonly called, *hemlock gum*, which spontaneously exudes and hardens upon its bark.

3. *A. communis.*—*A. excelsa*, De Candolle.—*Pinus Abies*, Linn.—*Norway spruce fir.*—*Pesse, epicea, faux sapin*, French. —*Gemeine Tanne, Rothtanne*, Germ. *Sp. Ch.* "Leaves solitary, four-cornered. Cones cylindrical. Scales rhomboid, flattened, repand at end, eroded."—*Lindley.* This is a very large tree, growing abundantly in Norway, Sweden, Russia, and the north of Germany, and found in the mountainous regions of France, Italy, and Spain. It sometimes attains the height of 150 feet or more, with a trunk from three to five feet in diameter. Its branches, which spring from the lofty erect trunk in a verticillate manner, are thickly clothed with a dark green foliage, and, frequently drooping somewhat towards the earth, give a funereal aspect to the tree. It affords turpentine by incision, and is one of the sources of *Burgundy pitch*, which is also obtained from the *Abies Picea*. Another product of the tree is the *resina abietis, thus*, or *frankincense* of British pharmacy. This is in brittle grains or lumps, brownish yellow on the outside, white within, and of an agreeable resinous odour.

It is frequently employed on the continent of Europe as incense in the churches, on account of the pleasant odour it emits when burnt. It is not used in this country. The tops or young branches of this species, and of the *A. Picea*, are used in Europe for flavouring beer, in the same manner as those of the black spruce in this country.

4. *A. nigra.*—*Pinus nigra*, Pursh.—*Black spruce. Sp. Ch.* "Leaves solitary; four-cornered, erect, straight. Cones ovate. Scales elliptical, wavy at edge, erect."—*Lindley.* The black spruce is an indigenous species, inhabiting the same regions with the *A. canadensis*, with which it forms immense forests in the north-eastern section of America. It has a smooth perpendicular trunk, gradually tapering to the summit, and attaining, in its fullest development, the height of 70 or 80 feet. The branches are horizontal, and in insulated trees arranged so as to form the pyramidal summit common to all the species. The leaves are about four lines long, of a dark dusky green colour, firm, numerous, and attached irregularly over the surface of the branches. The fruit is a reddish, ovate cone, pointing towards the ground, and from eight lines to two inches long. This is the tree of which the young branches are used in this country for the preparation of *spruce beer*. A decoction in water is first formed, and then made to ferment by the addition of a due proportion of sugar or molasses, and yeast. The preparation kept in the shops under the name of *essence of spruce* is prepared by evaporating the decoction of the young branches. It has usually the colour and consistence of molasses, with a bitterish, astringent, acidulous taste. It is much employed, as a substitute for the branches themselves, in the preparation of beer. The following is a formula recommended. Take of essence of spruce half a pint; pimento bruised, ginger bruised, hops, each, four ounces; water three gallons. Boil for five or ten minutes: then strain, and add of warm water eleven gallons; yeast a pint; molasses six pints. Mix, and allow the mixture to ferment for twenty-four hours. This is a wholesome and pleasant drink in warm weather, and occasionally beneficial in chronic debility of the digestive organs. It is said to be useful in preventing scurvy, for which purpose it is sometimes used on long voyages.

5. *A. picea.*—*A. pectinata*, De Candolle.—*Pinus picea*, Linn.—*European silver fir.*—*Sapin commun, sapin argenté*, French.—*Weisstanne, Edeltanne*, Germ. *Sp. Ch.* "Leaves solitary, flat, emarginate, pectinate. Scales of cone very blunt, appressed."—*Lindley.* This is a native of Europe, growing throughout nearly all Germany, and in the mountainous districts of France and other parts of the continent. It bears a close resemblance to the *A. balsamea* or American silver fir, but is a much larger tree, attaining, it is said, in some instances, the height of 150 feet, with a trunk six feet in diameter. Like the American species it has a silvery aspect, derived from the white colour of the under surface of the leaves. It is rich in juice, and furnishes the same terebinthinate products as those obtained from the pines. The substance known by the name of *Strasburgh turpentine* is obtained from it; and it contributes to furnish the *Burgundy pitch* of commerce. The buds are used in medicine, and are kept in the shops of continental Europe. They abound in a resinous matter, which often exudes upon their surface in the shape of small tears. The tops, like those of the Norway spruce fir, are used to flavour beer; and the young branches of both species are said to exude a kind of manna.

Other species of Abies are, the *A. Fraseri, A. alba*, and *A. rubra*, of North America; and the *A. orientalis*, of the Levant; but as these yield no particular products, they do not merit notice in this place. The *A. rubra*, or *red spruce*, is maintained by Michaux to be merely a variety of the *A. nigra*, and may possibly be employed like it in the preparation of essence of spruce. The *A. alba, white spruce*, or *single spruce*, is cultivated in France, where the buds are said to be sometimes kept in the shops instead of those of the silver fir.

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Philosophy of Natural History, or Phenomena of the Organization of Animals and Vegetables. By J. J. VIREY, Doctor of Medicine of the Faculty of Paris, &c. &c.

THE author of the "Philosophy" has been long known as one of the most prolific writers of the times. An active and useful member of the *Société de Pharmacie* of Paris—busily engaged, too, in the exercise of his calling, he has yet found time and inclination to discuss voluminously, and at the same time, most fancifully, many interesting and intricate points of anthropology. Early in his career of authorship, he selected moral rather than physical man for the object of his investigations; but, of late, his inclinations appear to have led him more to the cultivation of the natural sciences. Seven-and-twenty years ago, he published a treatise in two volumes on the Art of improving Man; in 1817, Medico-philosophical Researches on the Nature and Faculties of Man, in one volume; in 1820, a Natural History of Medicines, Aliments, and Poisons, in one volume; in 1822, a History of the Manners and Instinct of Animals, in three volumes; in 1823, a volume on the Vital Power; in 1824, his Natural History of Mankind, in three volumes; in 1830, the second edition of his Philosophical Hygiéné; in 1833, the third edition of Treatise on Pharmacy, in two volumes; and, lastly, the work before us. Besides these separate publications, the pages of the *Nouveau Dictionnaire d'Histoire Naturelle*, of the *Dictionnaire des Sciences Medicales*, and of many of the periodicals of the day, contain numerous evidences of the author's industry and zeal in the cultivation of his profession. Every thing that emanates from him indicates research, and almost all exhibit vivid, we might perhaps say, boundless imagination. The predominance, indeed, of the latter quality detracts largely from the value of most of his productions, and has acquired him the character, with some, of being the most fanciful of anthropological speculators.

The work before us is divided into four books; the first of which is entitled General Physiology, or Principles of Organization, animal and vegetable; the second is on the the Origin and formation of Beings as regards their Destruction; the third, on the Developments of organic Forms and their Functions; and the fourth on the Reproduction of Beings, animal and vegetable.

In respect to the theory of the formation of living bodies, M. Virey is a decided *univocalist.* All philosophers are so, as regards the beings highest up in the scale; but many distinguished naturalists, amongst whom may be mentioned De Lamarck, Raspail, Treviranus, Burdach, Gruithuisen, and Wrisberg, conceive it probable that spontaneous or equivocal generation may occur in the lowest divisions of living bodies.

M. Virey, however, considers, that facts, gradually developed in the wonderful progress of the natural and anatomical sciences, are sufficient to annihilate "the monstrous hypothesis of the spontaneous life of matter, and the pretended formation of organized beings, by blind inorganic substances."

His views on the difference between organized and inorganic bodies are singularly fantastic, and often by no means intelligible. Witness the following extract:—

"Different progressive degrees of animation may be observed in organic substances. First, a simple gelatinous liquid offers the first framework of all organization. Subsequently, an albuminous substance, susceptible of concretion, passes successively to the form of the more or less solid tissues. The fibre constitutes the more or less hard wood of vegetables, or the muscular flesh of animals. Lastly, the nervous pulp contains, during life, the most striking excitative faculties of the whole economy.

"These four principal elements, *gelatine, albumen, fibrine*, and *nervine*, enjoy properties more or less active, as contractility, which is the attribute (*apanage*) of the muscular fibre, and sensibility, with which the medulla of the nervous cords is endowed. The substance composing the muscular fibre, and the neurilemma (the membrane enveloping the nervous element), are more soluble in acids than in alkalies. The nervine or pulp of the nerves is soluble in alkalies, and not in acids. The contained is thus found in a state opposite to that of the containing. The latter is the anelectric (*cohibant*) of the former: their reciprocal polarity is therefore contrary or inverse."

In its general character the work before us is liable to all the objections that apply to M. Virey's works in general. Perhaps, indeed, there is a greater admixture of obscure psychology, or what he would doubtless term "philosophy," in the present than in his preceding publications. Of this we have a signal example in what he calls his Terminal Propositions, which conclude the text of the work, and embody, as it were, his leading principles of organization.

"1. Is the DIVINITY the *intellectual principle*, the *vital force* of the world (in the universal encephalon *), analogous to the nervous fluid, or to the celestial Ether?

"2. Is NATURE like the general nervous apparatus, distributing to all parts of the spheres movement and life, for the organization and development of animal and vegetable beings?

"3. Are the MASSES, called INORGANIC and ANORGANIC, materials constituting the different bodies which compose the worlds, either in the permanent mineral and chemical condition, or in the transitory condition of organization, through the influence of the vivifying principle?

"4. Do ORGANIZED BEINGS, in their individual and transitory existence, emanate as temporary productions from the great tree of life?

"5. Is each of its different BRANCHES or STOCKS of SPECIES attached to a common trunk by paternal connexions, in their genera and families, according to the general law of life, reproduction, and destruction?

"6. Do all ANIMATED SPECIES (without excepting the human race, terminal or regulating—*terminale ou regulatrice*—on our planet) undergo, like *their individuals*, the law of development, increase, vigour, and multiplication, and afterwards of old age and death, to accomplish the orbit of transformations or modifications in accordance with those of the star that nourishes, and causes them to expand and fructify?

"7. Do not all the organized beings of our world aspire by successive development, and by a more and more complicated evolution, to rise progressively towards the pinnacle of perfection, in order to approach the organism of man? The vegetable, which is at first the most imperfect, tends to attain a higher rank from its birth and to its complete development, as man from the primitive embryonic point runs through all the steps of the zoonomic scale. The circle of progression which happens to each individual of the human race, takes place in the species constituting the parallel threads of the vegetable and animal kingdom.

"8. Are the *human race*, and the other *animal and vegetable species*, subordinated in their reciprocal harmonies, or dependent (*pondérées*) upon each other, according to their forms and instincts of life, whilst *minerals* are subjected to mechanical and chemical law? The latter can only obey physical necessities. The more other bodies enjoy of spontaneity in their mobility and sensibility, the farther extends the circle of their attributions. Lastly, the human race deploys over the inferior beings, and over its own race, providential acts of the creative power, of which it becomes the minister over this globe.

"9. Circumscribed within the limits of his organization, *civilized* MAN can only act with a liberty restricted within the sphere of his destinies, although one less restricted than that of the instincts of other animals. He pursues the course prescribed by the supreme Arbiter, without being able to overstep it—any more than every other creature, according to his constitution and intellectual rank in the general order of the universe?"

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* "Sensorium universale, of Isaac Newton and of Samuel Clarke.

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ON THE CARNATION.

The carnation is little known in its wild state, though it has been found in England on rocks and walls. It was not known to the ancients in its cultivated state; but has been a favourite flower in Europe for an indefinite length of time. It is generally supposed to have been introduced from Germany or Italy, in which countries it is more cultivated than in England; Gerarde, in 1597, received it from Poland. "Of all the flowers that adorn the garden," Hogg observes, "whether they charm the eye by their beauty, or regale the sense of smelling by their fragrance, the carnation may be justly said to hold the first rank. The stateliness of its growth, the brilliancy and diversity of its colours, and the sweetness of its perfume, never fail to attract our regard and admiration. The tulip, though styled the queen of the garden, cannot boast of more admirers; they may with propriety be considered the two master-pieces of nature; and, though rival beauties, may be said to share the sovereignty of the garden equally between them. Yet it must be admitted that the carnation, independent of its fragrance, has this advantage over its rival, that it continues longer in bloom; and that, when planted in pots, it can be removed to decorate the green-house, the conservatory, or the drawing-room." The carnation and picotee, he adds, in 1833, still continue to adorn the flower gardens of our nobility and gentry, for this reason, that after the attraction of the metropolis has ceased, and they have retired to the country in the beginning of July, the ladies find these flowers ready to greet them with the most inviting fragrance during the greater part of July and August.

Professional gardeners are not very good cultivators of carnations, however lightly they may treat it, and however confident they may feel of doing it. If they neglect to prepare proper composts, their plants will not thrive; if they do not pay requisite attention to them before, and during their flowering, the bloom will not be worth looking at; if they do not understand how to propagate them, they will all very soon perish. Gardeners unaccustomed to flowers are, in general, bad propagators. Few of them have any right notion of piping; and though nothing is more simple, they never set about it as if they wished to succeed. They are likewise great bunglers in laying: there is not one in ten whose assistance we would claim upon the most pressing occasion, and leave the operation to them uncontrolled and unlooked after; whereas, we could trust to any amateur cobbler, tailor, weaver, or barber who had had the least practice with his own flowers, to do this laying in the most satisfactory manner. It is well known that very few of them, unless fond of the flower itself, seem to take any care of them, or treat them right, or bloom them well. The London Horticultural Society, in the time when Mr. Sabine was secretary (and virtually director) were at some pains and expense to form a collection of carnations and picotees, both English and foreign; but they had not a man in the garden who knew how to treat them, and they all perished in a year or two.

The varieties of this flower are now arranged in three classes: flakes, bizarres, and picotees. Flakes have two colours only, and their stripes large, going quite through the petals; bizarres (Fr. odd, irregular) are variegated in irregular spots and stripes, and with not less than three colours: picotees (Fr. piquettée, pricked or spotted) have a white ground, spotted or pounced with scarlet, red, purple or other colours. Of each class there are numerous varieties, arranged under the farther subdivisions of scarlet, flake, pink flake, purple flake, yellow flake, &c. scarlet bizarre, crimson bizarre, &c. and purple picotée, yellow picotée, &c. Hogg gives a catalogue of nearly 350 sorts, so arranged, named after great personages, all of which were in his possession at the time he published his Treatise on the Carnation in 1820. Only double varieties are in esteem. As an oddity may be mentioned the double dwarf carnation of Liège, with sessile flowers. There is also a variety called the tree carnation, with suffruticose stems, which may be trained against a wall, trellis, or stakes, to the height of five or six feet, and will live as many years, flowering every year.

The time for propagating by layers is when the plants are in full bloom: some defer it till the flowers are on the decline, but in that case the new plants are not so well rooted as those layed earlier, and consequently less able to stand the winter. Laying, by the wounds it inflicts, considerably impairs the bloom, and generally kills the parent plant. The practical part of the operation has nothing extraordinary in it; a sufficient quantity of pegs and of compost being provided, the pot containing the plant to be layed is placed on a table, and the layers prepared by cutting off their lower leaves: the earth is then stirred, and the pot filled up with light rich mould, not of too fine a grain. The incision is made by entering a quarter of an inch below the joint, and passing the knife up through the centre of it: it is then to be pegged down, and buried not more than half an inch deep. It is advisable to peg down the layers in a dry state, being then less brittle, and consequently not so liable to break off as when they are wet and succulent; therefore, as soon as the layers are dressed, the pot should be placed full in the sun for half an hour, in order to render them more flaccid and pliant than they otherwise would be. When the layers are properly rooted, which will be the case with most sorts in about three weeks or a month after laying, provided due care be taken to keep them regularly moist, and to shade them from the heat of the meridian sun, they are then to be cut off from the old plant, with about half an inch of the stalk which connects them with it, and be immediately planted in small pots, three or four plants in each, placed round the sides. The pots are to be placed under an arch of hoops, where they can be covered with mats, in case of excessive rains, till the severity of the weather renders it necessary to remove them into their winter repository, which is to be constructed in the same manner, and have the same aspect as that described for auriculas.

ON THE CRITERION OF A PINE CARNATION.

THE stem should be strong, tall, and straight; not less than thirty or more than forty-five inches high; the footstalks supporting the flowers should be strong, elastic, and of a proportionate length. The flower, or corolla, should be at least three inches in diameter, consisting of a great number of large well-formed petals; but neither so many as to give it too full and crowded an appearance, nor so few as to make it appear too thin and empty. The petals should be long, broad, and substantial, particularly those of the lower or outer circle, commonly called the guard leaves; these should rise perpendicularly about half an inch above the calyx, and then turn off gracefully in a horizontal direction, supporting the interior petals, and altogether forming a convex and nearly hemispherical corolla. The interior petals should rather decrease in size as they approach the centre of the flower, which should be well filled with them. The petals should be regularly disposed alike on every side, imbricating each other in such a manner as that both their respective and united beauties may captivate the eye at the same instant: they should be nearly flat, however a small degree of concavity or inflection at the lamina or broad end is allowable: but their edges should be perfectly entire, that is to say, free from notch, fringe, or indenture. The calyx should be at least one inch in length, terminating with broad points, sufficiently strong to hold the narrow bases of the petals in a close and circular body. Whatever colours the flower may be possessed of, they should be perfectly distinct, and disposed of in long regular stripes, broadest at the edge of the lamina, and gradually becoming narrower as they approach the unguis, or claw of the petal, there terminating in a fine point. Each petal should have a due proportion of white, i. e. one half, or nearly so, which should be perfectly clear, and free from spots. Bizarres, or such as contain two colours upon a white ground, are esteemed rather preferable to flakes, which have but one, especially when their colours are remarkably rich, and very regularly distributed. Scarlet, purple, and pink are the three colours most predominant in the carnation; the first two are seldom to be met with in the same flower, but the last two are very frequently. When the scarlet predominates, and is united with a paler colour, or, as it sometimes happens, with a very deep purple upon a white ground, it constitutes a scarlet bizarre, of which there are many shades and varieties, some richer and others paler in their colours, as is the case with all the rest. Pink bizarres are so called when the pink abounds; purple bizarres when the purple abounds; crimson bizarres consist of a deep purple and rich pink. When the pink flake is very high in colour, it is distinguished by the appellation of rose flake; but some there are so nearly in the medium betwixt a pink and scarlet that it can scarcely be defined to which class they belong. In addition to the foregoing varieties, there is a sort held in great esteem by cultivators, called picotee, many of which are very beautiful, and, being hardier than the other sorts, are in considerable request. The colours are principally yellow, and white spotted; their properties are the same as the other kinds, except that the edges of the petals are serrated or jagged, and the colour is disposed in spots, where the others are striped. It is propagated in the same manner as the others.

ON THE COTTON TREE.

THIS plant, it is well known, has been cultivated from time immemorial on the continent of India: it likewise grows in Africa and forms a staple commodity in many southern countries. The cotton tree was met with in Mexico at the time when the Spaniards effected the conquest of that territory. But it is not to its native place, or to the part of the world where its cultivation is carried on, that cotton is to be regarded as solely serviceable to the human race. There is scarcely any substance drawn from the vegetable world, whose adaptation to manufacturing purposes is more extended, and it would require almost a volume to describe the useful purposes to which cotton is applied. It appears that this plant succeeds best in light sandy soils, which are moderately moist. Volcanic depositions are found to agree best with the cotton plant; the soil next in rank as favourable to its growth, is a fine sand, where particles are held together by a small portion of clay, or calcareous earth, particularly if mixed with decomposed vegetable matter. The choice of seed, and the method of sowing them, form the next subject of observation; and then the progress of the plant is traced to maturity, directions being given for its management in every stage. The perennial cotton tree rarely produces a full crop before the second year of its growth; but after this it usually remains productive for a period of four or five years. The blossoms are generally expected to appear in July or August; and after the blossoms come the pods in which the cotton is contained. When the fruit is ripe the pods open, and exhibit their woolly contents in the form of locks of a brilliant whiteness, each look being contained in a cell of the pod. The cotton is subsequently removed from the pods, and this, from the earliest date, has been habitually accomplished by a machine. There have been, of course, various improvements in the engine, but that which is now in exclusive use is called a gin, which Mr. Porter tells us was, up to a recent period, of the very simplest construction, being composed of two hard-wood cylindrical rollers, each about an inch in diameter, and furnished with five or six longitudinal grooves, or flutings. These rollers were placed horizontally, one over the other, almost in contact, one end of each being fixed into the centre of a fly wheel thirty inches in diameter, two of these wheels being attached to the gin for this purpose, one at each side. The wheel bearing the upper cylinder was at rather a higher level than that which bears the other, and both were caused to revolve by means of a foot-board, similar to that of a common turning-lathe, motion being thus given to two straps or cranks, one attached to the exterior of each fly-wheel, at a point somewhat removed from its centre. The person working at this gin employed his feet to set it in motion, while his hands were occupied in feeding the cylinders with cotton. This being engaged by the fluted rollers, was drawn between them through to the side beyond, leaving behind it the seeds which were too large to pass between the same opening.

The principle of this apparatus is still retained in the modern gin, except that it is provided with the addition of a kind of rugged comb, having teeth two inches long, and about two-thirds of an inch apart, with sharp points. This comb, which is placed parallel to the rollers along their whole length, and nearly in contact with them, is kept constantly and rapidly moving up and down, so that the sharp teeth being engaged with the locks of cotton, tear them asunder in their passage to the cylinders, and thus facilitate the separation of the seeds. It is an inconvenience found to attend the use of this comb, that its teeth coming too directly and violently in contact with the seeds, they are sometimes broken into small pieces, and in this state will pass with the wool through the cylinders. These particles, together with all other foreign matters which may still be included in the wool, and all discoloured portions, must afterwards be carefully removed by hand picking, and this process is called *moting*. An industrious hand will mote from twenty-five to thirty pounds of cotton in a day.

The cotton plant has its enemies principally in the insect creation. The cotton bug infests it in swarms, and consumes it with such rapidity, that they do not leave a trace of leaf, or flower, or pod on a tree in the morning, which had been perfectly untouched the evening before. In their ravages over the fields of cotton, the insects exhibit an apparent capriciousness, as they will pass over certain fields of the plant, and all, by common consent, as it were, will infest another. Again, it is a peculiarity of these caterpillars, that they usually begin their ravages at the centre of a field, and it is only when their numbers are exceedingly great that they attack at all parts, indiscriminately, and at once. They likewise choose preferably those plantations which afford them the completest shelter, so that one means of avoiding, or rather of lessening the chance of that evil, is to plant the trees at sufficient distances from each other.

Of these obnoxious creatures, a few words on the natural process whereby the destruction is partially effected may not be uninteresting. Poultry, and particularly turkeys, are fond of the chenille, the name of this caterpillar: large broods of these birds are even kept for the purpose. There is a particular bird, the *piper aureola*, which has obtained the common name of chenille bird, from its predilection for them as food; and it is curious that naturalists have observed that the insect and the bird appear and disappear at the same time with each other, and, as some say, the number of birds is found nicely adjusted to the proportion of insects on which they are to feed. Even the stem of the plant has an enemy in an insect peculiar to itself, which continues always buried, or crawling on the surface of the ground. The ravages of this insect are consequently at an end after the first week following the appearance of the plant above the ground. During this time it gnaws the stalk about half an inch from the surface, the seminal leaves are thus cut off, and the plant perishes. If it escapes at this earliest stage of its development, the leaves are placed out of the reach of the destroyer, and the stalk becomes too hard for its attacks.

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THE COMMON BAMBOO CANE.

THE Bamboo has a woody, hollow, round, straight culm, forty feet high and upwards, simple and shining; the internodes a foot in length and circumference; sheaths thick and hairy, rough, convolute, deciduous; branches alternate, slender, solid, spiny, reclining, springing out from the base to the very top; the lower ones being usually cut off. Panicle of flowers diffused in spikes.

The hollow internodes of the culm are frequently found filled with a limpid liquor, which in India beyond the Ganges is not condensed into the substance called *Tabaxir* or *Tabasheer*, as it is, though rarely, in Malabar.

This cane grows naturally almost every where within the tropical regions. Over a great part of Asia it is very common. In China, Cochinchina, Tunquin, Cambodia, Japan, Ceylon, the peninsula of India, and the islands.

This useful plant has been long since introduced into the West Indies; and is said to flourish likewise in South Carolina. Plants more than twenty feet high have been raised in this country. A strong shoot from the root will grow twenty feet in five or six weeks. Some of the stems are as large as a man's wrist, but in general, they are as big as common walking sticks, and when dried are as fit for that purpose as those which are imported.

There is perhaps scarcely any plant that serves for such a variety of domestic purposes as the Bamboo. In the East Indies great use is made of it in building, and the houses of the meaner people are almost entirely composed of it. Dr. Patrick Browne mentions, that it was yet strong and perfect in some of the houses which had been built by the Spaniards in Jamaica, above a hundred years before. Bridges also are made of it, masts for their boats, boxes, cups, baskets, mats, and a great variety of other utensils and furniture, both domestic and rural. Paper also is made from it, by bruising, and steeping it in water, and thus forming it into a paste. It is the common fence for gardens and fields; and is frequently used as pipes for conveying water. The leaves are generally put round the chests of tea which are sent to Europe from China, as package, fastened together so as to form a kind of mat. The tops of the tender shoots are frequently pickled in the West Indies.

In the cavities, or tubular parts of the Bamboo is found at certain seasons a concrete white substance called tabasheer, or tabachir, an article which the Arabian physicians hold in high estimation. It is commonly found in what are called the female or large bamboos. The bamboos which contain this concrete, are found on shaking to contain a fluid, which, after some time gradually lessens, and then they are opened in order to extract the tabasheer. The nature of this substance is very different from what might have been expected in the product of a vegetable. Its indestructibility by fire, its total resistance to acids, its uniting by fusion with alkalies in certain proportions into a white opaque mass, into a transparent permanent glass, and its being again separable from these compounds entirely unchanged by acids, &c., seem to afford the strongest reasons for considering it as very nearly identical with common siliceous earth. As to its medical virtues, though the drug be, as before observed, in much esteem with the Orientalists, yet they are not such as to cause it to have any regard paid it in the modern practice of physic in Europe.

Yet the virtues of the several parts of the bamboo are very considerable, according to Loureiro, who in his Flora Cochinchinensis, tells us that the leaves, bark, buds, and root are used. The leaves, he says, are cooling, emollient, and resolvent: their decoction is good in fevers, coughs, pains of the throat, &c.; the thin bark is cooling and agglutinant, and a gentle astringent: it is good in feverish heats, hæmorrhages, nauseas, and vomitings: the roots and buds are attenuating, and promote urine, and purify the blood, are good in difficulties of urine, wandering pains, obstructions, and in other cases:

from the fresh roots mixed with tobacco-leaves and betel in equal proportions, and infused and macerated for some days in oil, is prepared an ointment of great efficacy in discussing hard and scirrhous swellings.

β. The leaves of this variety are much narrower, particularly at their base. It is more rare in Europe, though the most common on the coast of Malabar.

γ. The Turks make their writing pens with this variety. It was observed by Tournefort in a valley near Mount Athos, and on the banks of the river Jordan.

ON COFFEE.

Coffee is supposed to have been originally a native of Arabia, and to have been carried only very lately to the tropical regions of the West. It appears, that, in the year 1690, Van Hoorn, the then governer of Batavia, procured some berries of the coffee-tree from Mocha, in Arabia Felix, and raised many plants in the Island of Java, whence he sent one to Nicholas Witsen, a Burgomaster of Amsterdam, and then governor of the Dutch East India Company. This plant arrived in a healthy condition, and was placed in the Botanical Garden of Amsterdam, where, by careful management, it was made to bear seeds, and, in the course of a few years, many young plants were raised from its produce.

It was an offspring of the Amsterdam shrub, transported to the western world, that first gave rise to the expectation of its thriving there. It was only in 1718 that the first plantations were made in the colony of Surinam; ten years after this, the French introduced it into Martinico; in 1728 only, was it brought into Jamaica. At the close of the last century, the amount of coffee imported into Great Britain from the West Indies, was about two hundred and fifty tons—now, it is about forty times that quantity. It is well known of the coffee-plant, that it will succeed in no country liable to the visitation of frosts, and, in short, in no other latitude, than between or very near the tropics. It only grows well where it is intermingled in plantations with other trees, which may shelter it from the rays of the sun, as by such an influence acting on it, the fruit may be prematurely ripened. These protectors consist generally of palmachristi, or the castor-oil plant, but yams, or any kind of running vines, are never planted in this way, as they wind about the trees and injure them. The enemies to which the coffee-tree is most likely to owe its untimely destruction, is a little insect called the coffee-fly, the creature commiting its ravages by means of two weapons toothed like saws, which proceed from its head, and with which it cuts a multitude of deep notches in the trees.

Another insect, observes the author, to which planters have given the name of *the Grub*, is sometimes very injurious. In colour and appearance this little creature resembles a flake of snow. It makes use of a kind of trunk, or proboscis, with which it is furnished, in order to pierce the young bark of the coffee-trees. All mischief arising from this insect may be easily averted by planting pine-apples between the rows of the trees, which the insect will immediately quit that it may feed upon the leaves of the pine-apple, of which it is immoderately fond.

Field rats are very injurious to coffee-plantations, but, in some French coffee-colonies, these rats themselves are said to be used as human food, and the poor negroes are, therefore, particularly interested in not discouraging the invasions of those marauders, on whose booty they find a good subsistence. The coffee is known to be ripe when the berries assume a deep and rather brownish red. This hue being once established in the berry, no time is lost in pulling it. In the gathering of the crop, which usually takes place in August and September, the negroes are provided each with a small basket or bag, with a stout wire or iron ring at its mouth to keep it constantly open, and this is slung round the neck in order to leave both hands at liberty. Holding then the branch of the tree with the left hand, they select from it the berries which are ripe, and, picking them with the right hand, deposit them in the basket. In performing this operation, care must be taken not to injure the branches, or to bruise the newly-formed buds, which should expand themselves shortly after. All green or unripe berries are left for future gatherings. When their baskets are full, they are emptied into other larger baskets placed in a central spot, and these are carried away, from time to time, to be emptied at the mill.

When the berries are gathered, they are left to dry, that the beans may be separated from the pulp. The berries are spread for this purpose, in thin layers, before the sun: the coffee is then husked, in a mill so contrived as very easily to effect the separation of the beans from the husks: both are next let into a wire sieve, made in the form of an inclined plane; the husks, dry and broken, pass through the meshes of the wire, while the beans run down into a different receptable along the bottom of the sieve. The coffee is then transferred to a vessel of water, in which it is steeped for a day to dissolve a gummy matter adhering to it: it is next put into wooden troughs to be washed; and, lastly, the coffee is dried once more, being placed, as before, in layers, on smooth tiles, before the sun. After the completion of these processes, the coffee is stored up for some time, and must be daily turned over. But this is not all; for the pellicle of the bean, or, as it is called in the colonies, the parchment, still survives, and must be got rid of. The most usual plan for accomplishing this object is, to provide a solid wheel, made of hard wood, six or eight feet in diameter, and from eight to twelve inches thick. This wheel is made to work in a circular trough, by means of an axis passing through its centre, one end of which is connected by an iron collar, with the centre post, to the mill, while the other end projects over the mill course, and, a horse or mule being harnessed to this end, the wheel is carried round the trough.

When the pounding-mill is set to work, the coffee is thrown into the trough, and the parchment having been already loosened from the beans, and rendered very friable by the repeated dryings it has undergone, is easily broken by the wheel and and separated from the beans.

But even after all this, the coffee is far from being fit for exportation; for, it must go to the fanning or winnowing mill, to be relieved from the minute particles of parchment which escaped the correcting power of the pounding-mill, and lest there should be any thing still of which the unfortunate berry requires to be cleansed, it will most certainly be detected by the experienced eye of one of the circle of negroes, called pickers, who sit round a table heaped with the berries, and examine every individual berry with the utmost care. When winnowed, and picked in this way, coffee is deemed to be in a condition worthy of the privilege of exportation. This country receives its chief supply from the West Indies, the amount of that from foreign parts which is consumed here, being a very small portion indeed of the general amount.

ON THE MANAGEMENT OF BEES IN CASHMERE.

Every farmer in Cashmere has several bee-hives in his house; in some instances no less than ten.

A provision is made for these in building the house, by leaving appropriate cavities in the walls, which somewhat differ in size, but agree in their general form, each being cylindrical, and extending quite through the wall. The tube thus formed is lined by a plastering of clay mortar, about an inch in thickness, and the mortar is worked up with the chaff or husk of rice, or with the down of thistles, which latter is employed also for clay mortar in general, being the only application of this substance to the use of man. The dimensions of a hive are, on an average, about fourteen inches in diameter, and when closed at both ends about twenty or twenty-two inches in length. That end of the cylinder nearest the apartment is closed by a round platter of red pottery ware, a little convex in the middle, but with the edges made flush with the wall by a luting of clay mortar; and the other extremity is shut by a similar dish, having a circular hole about a third of an inch in diameter in its centre.

There is no particular part of the house assigned as the proper situation of these hives, as they are placed indifferently either in the walls of the basement story, or in those of the first floor. The only stage in the management of bees in Cashmere which possesses any novelty or interest, as compared with the treatment of these insects throughout Europe, consists in a humane method of preserving the old swarm when the honey is taken. The plan, as seen executed by a recent traveller, is as follows:—

"Having in readiness a wisp of dry rice-straw, and a small quantity of burning charcoal in an earthen dish, the master of the house, with a few strokes of the point of a sickle, disengaged the inner platter of the tube, bringing into view the combs suspended from the roof of the hive, and almost wholly covered with bees, none of which, however, offered to resent the aggression, or to enter the room. Having placed the straw upon the charcoal, and holding the dish close to the mouth of the hive, he blew the smoke strongly against the combs, but removed the straw the instant it took fire, to prevent it burning the bees, and quenched the flame before he employed it again. Almost stifled by the smoke, the bees hurried through the outer door with such rapidity that the hive was cleared of its inhabitants within a few minutes; when the farmer, introducing the sickle, cut down the combs nearest to him, which were received into a dish previously slidden underneath them, and left undisturbed about one-third of the combs which were almost close to the outer door. He then replaced the inner platter, and brushing off hastily a few bees which clung to the combs, though apparently in a state of stupefaction, threw them out of the house. Observing many other bees lying motionless on the floor of the hive, I inquired whether they were dead or only stupified, and was answered that they would recover; however, I was not wholly satisfied that this recovery would take place: preparations for continuing my journey at a very early hour on the following morning having unluckily prevented my examining the spot where they had been thrown, until poultry had for some time been feeding near it.

"The expelled bees returned as soon as the cavity was freed from smoke without stinging a single individual; and the whole business was completed within ten minutes, without, as was asserted, any perceptible loss. The honey was light-coloured, and of a taste as pure and sweet as that of Narbonne. It possessed less of the cloying quality generally attending this substance than any other I recollect to have met with; and I could not learn that the farmers had any suspicion of its ever being intoxicating or poisonous, as is the case occasionally with that made by the Bhoura (apis irritabilis), or large wild-bee in the northern mountains of Gurwhal, from feeding, as it is reported, on the flower of the monkshood. I was directed more particularly to inquiry upon this subject, by having observed this plant in flower in the valley of Runga, a few miles to the eastward of the bee district, and think it probable that it extends to these mountains.

"The peasantry of Cashmere are unacquainted with the employment of honey as the basis of a fermented liquor, but eat it raw, or mixed with articles of common food, whilst the most wealthy substitute it for sugar in preserving fruits. It is customary to take the hive every year, and the end of September or beginning of October is found the best season for this operation: a little time still remaining for the bees to add to the portion left for their support during five months. This amounts to about one-third of the whole produce, and would appear to suffice, as swarms seldom die, and the Cashmarees substitute no other article for food. It is stated that an old swarm yields more honey than a young one, and that families seldom die except of old age. I was informed that it was no uncommon circumstance to preserve the same community for ten and even fifteen years, and some instances were quoted of a family having been retained for twenty years; but this was held to be of very rare occurrence. In consequence of the bees being thus literally domesticated, they acquire a mildness of conduct far more decided than those of Europe; and it is possible that the confidence thus gained, subduing their natural irascibility, may generate an increase of industry, or, at least, an increase of produce in relation to the number and size of the individuals of each community. It is also clear, that the situation of the hive keeps many of the natural enemies of the bees at a distance."

ON CARNATION SEED.

Carnation seed is rather difficult to raise or ripen in this country, owing to the moisture and cold of the autumnal months. It is generally procured from Vienna and different towns of Switzerland; and if put in phials and well corked, will keep for years. To raise it in this country, it is necessary to procure those flowers which have but few petals, or, as it is more commonly expressed, are thin of leaf, generally produce most seed, and therefore are most to be depended on for a supply; but they should be possessed of the best properties in other respects, viz. their petals should be large, broad, substantial, and perfectly entire at the edge, and their colours rich and regularly distributed, and in due proportion, throughout the whole blossom. The plants should be selected from the rest, and their pots should stand upon a stage, defended against earwigs, in an open part of the garden, in which situation they should remain during bloom, and until the seed is perfectly matured; their blossoms should be defended from rain, by having glass, paper, or tin covers, suspended over them, in such a manner as to admit a free circulation of air; the pots should neither be kept very wet nor very dry; nor will it be proper to cut and mutilate the plants, either for their layers or pipings, till the seed becomes ripe, because it would certainly weaken them, and consequently injure, if not destroy, their seed. When the bloom is over, and the petals become withered and dry, they should be carefully drawn out of the pod or calyx, being apt to retain a degree of moisture at their base, endangering a mouldiness and decay in that part, which will destroy the seed. There is another mode of treatment adopted successfully in ripening the seed, which is, when the bloom is over and the petals begin to decay, they are to be extracted as above, taking particular care to leave the two styles, which appear like horns proceeding from the summit of the germen, or future pericarpium: the calyx is then to be shortened to about one half of its original length, and an aperture made on one side of the remainder, down to the base of the pericarpium, so that no water can possibly lodge there; but in doing this, great care is necessary not to wound or injure the pericarpium, or seed-vessel itself; because it might prove destructive to the seed. After the above is performed, the covers may remain or be taken away at pleasure; but in the latter case it is advisable to loosen the upper part of the stems from the sticks, that the open end of the calyx may incline a little downwards, the more effectually to preserve it in a dry state; the stems should not be suffered to hang so loose as to be in danger of breaking off with every puff of wind. The seed ripens from the end of August to the beginning of October: the pericarpium becomes brown, dry, and hard, and the seed, when ripe, is of a black or very dark brown colour; those who are not sufficiently attentive to the ripening of their seed, are apt to gather it too soon, before it is perfectly matured, in consequence of which the greatest part proves small, pale-coloured, and unproductive. When gathered, it should remain in the pericarpium, in a dry room, till the beginning or middle of May; it is then to be sown in pots filled with the compost, and have a little fine mould sifted upon it, barely sufficient to cover the seed: at this season of the year artificial heat is not required, the pots should therefore be placed in an airy part of the garden, be shaded from the heat of the sun, and kept moderately moist, but never very wet. As soon as the young plants appear with six leaves, and become about three inches high, they should be planted out on a bed of good rich garden mould, at about ten or twelve inches asunder, and be defended from excess of rain and severe frosts, by mats on hoops, placed over the bed in the usual manner: they will in general blow the following summer. Some persons have advanced an opinion, that the seed of run plants produces as great a proportion of variegated flowers as any other; but the validity of this assertion has not yet been sufficiently demonstrated by experiment.

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ON THE ACACIA.

This genus was separated from the Mimosa of Linnæus by Willdenow, who very appropriately conferred upon it the title employed by the ancients to designate one of its most important species—the gum tree of Egypt and Arabia. The medicinal species of acacia are prickly or thorny trees or shrubs, with alternate doubly-pinnate leaves, of which the leaflets are usually very minute. Their flowers are yellowish, and collected in axillary peduncled heads, or elongated spikes. The fruit is a dry leguminous bivalvular pod, of various form in different species. The bark and unripe pods contain astringent matter, and are said to be sometimes employed, in the countries where the plants abound, for tanning leather. The wood of one species—the *A. catechu*—furnishes the extract well known by the name of *catechu*. But the most important product of the *Acacias* is *Gum Arabic*, which is afforded by numerous species growing in Arabia and Africa. The gum exudes in dry weather, and hardens upon the bark, whence it is removed by the natives.

1. *A. arabica*, Willd.—*A. nilotica*, Delile.—*A. vera*, Vesling.—*Mimosa nilotica*, Linn.—The *A. arabica* is, when full grown, a considerable tree, with a stem somewhat crooked, covered with a rough brownish bark, and divided into numerous branches. It grows in Upper and Lower Egypt, and other parts of Africa, in Arabia, and in the East Indies. The astringent substance known by the name of *Acaciæ veræ succus*, and formerly used in Europe in the treatment of diarrhœa and dysentery, was procured from the unripe fruit of this species and of the *A. vera*, by expressing the juice, and evaporating it to the consistence of an extract. The fruit itself, which consists of a long, flat, ash-gray pod, contracted at certain intervals so as to present a succession of circular portions, each containing one seed, is used in India for tanning and dyeing black. Considerable quantities of it have been imported into France under the name of *Bablah*. It abounds in tannin and gallic acid, and is said to be superior even to galls for dyeing. *Gum arabic* is collected from the *A. arabica*, in various parts of Africa, Arabia, and Hindostan, but, according to Ehrenberg, not in Egypt, as the peasants are more profitably occupied in agriculture in those districts where it flourishes. Roxburgh states, that in Hindostan the gum is used by the natives as food, mixed with the cake which remains after the expression of the oil of sesamum.

2. *A. catechu*, Willd.—*Mimosa catechu*, Linn.—According to Mr. Kerr, this species of acacia seldom exceeds twelve feet in height. Others represent it as a lofty and elegant tree. It probably varies in size with the circumstances of soil and climate. Its trunk is very thick in proportion to its height, and is covered with a rough, brown bark, which is internally red, and has an astringent bitterish taste. The branches are very numerous, and the younger armed with prickles. The leaves are from six to twelve inches long, with thirty or forty pairs of minute leaflets upon each of the pinnæ, of which from fifteen to thirty pairs, according to Kerr, are arranged along the common footstalk. The flowers are in close spikes, four or five inches long, and placed two or three together in the axils of the leaves. The fruit is a flat, straight, smooth pod, pointed at both ends, of a light brown colour, four or five inches long, and containing five or six roundish compressed seeds. The tree grows in various mountainous districts of Hindostan, and is especially abundant in the provinces of Bahar and Canara. Catechu is obtained from it by evaporating a decoction of the wood, to which the bark and unripe fruit are sometimes added.

3. *A. Ehrenbergiana*, Hayne.—This is a shrub from six to eight feet high, inhabiting the Lybian desert, and the deserts of Nubia and Dongola, where it was seen by Ehrenberg, in whose honour it has been named. According to this author, it is called *Samle* (*Zamlay*) by the Bedouins, who collect gum from it for sale to the merchants.

4. *A. gummifera*, Willd.—This plant was observed by Broussonet, in the neighbourhood of Mogador, in Morocco; and the description of the species given by Willdenow in his edition of the Sp. plant, was drawn up from a specimen transmitted to him by that traveller. Forskal speaks of an *A. gummifera* as a native of Arabia; and Delile, referring to the same plant, mentions it as growing in Upper Egypt; but whether it is identical with the *A. gummifera* of Broussonet, we have no means of determining. It is probable that a portion of the *Barbary gum* is procured from this species.

5. *A. senegal*, Willd.—*Mimosa senegal*, Linn.—In Linnæus's description, three prickles are mentioned, of which the middle is recurved; but this is not always present, and is in fact an abortive branch or thorn. The *A. senegal* is a tree from fifteen to twenty feet high, and is easily distinguished at a glance from most of the other species by the whiteness of its bark. It is abundant in the regions about the rivers Senegal and Gambia, and forms a large portion of the acacia forests which grow in the country back of Portendic. It is said also to grow in Egypt and Arabia. It furnishes much of that commercial variety of gum called *gum Senegal*.

6. *A. seyal*, Delile.—This is a small tree, from fifteen to twenty feet high, growing in Upper Egypt, Nubia, Dongola, and the Lybian desert, and called by the natives *seyal*, which has been adopted as the botanical title. It is, according to Ehrenberg and Hemprich, among the trees from which gum is actually collected.

7. *A. tortilis*,* Hayne.—*Mimosa tortilis*, Forskal.—The *A. tortilis*, named from the peculiar character of its pods, is a large tree, attaining the height of forty or even sixty feet, with a trunk from two to four feet in diameter. It is a native of Arabia Felix, where it was seen by Forskal; and of the Lybian desert, Nubia, and Dongola, where, according to Ehrenberg, gum is collected from it by the Bedouin Arabs.

8. *A. vera*, Willd.—*Mimosa nilotica*, Linn.—This is not the *A. nilotica* of Delile, described by some authors as the *A. vera*. The former is identical with the *A. arabica* of Willdenow, and was confounded with the present species in the *Mimosa nilotica* of Linnæus. The *A. vera* attains, in favourable situations, the magnitude of a considerable tree, but is frequently nothing more than a shrub. Its trunk is erect, and divides above into very numerous prickly branches, of which the younger are externally of a reddish-brown or purplish colour. The leaves consist of two pairs of pinnæ upon a common footstalk, with from eight to ten pairs of leaflets on each pinnæ. The prickles are from one quarter to half an inch long, and always shorter than the leaves, near the base of which they are inserted. The flowers are in spherical heads, which are supported upon slender peduncles, and collected to the number of from two to five in the axils of the leaves. The fruit is a flat, leguminous, bivalvular pod, several inches long, divided by regularly recurring contractions into numerous circular portions, like a string of flattened beads, each portion containing one seed. This species grows through the interior of Africa, from Senegal to Egypt. It is said, in connexion with the *A. Senegal*, to form the greater part of the acacia forests, from which the gum Senegal is gathered. It is not, however, as stated by some authors, a native of the Cape of Good Hope. The acacia

growing in this part of Africa, which was considered by Sparrman and Thunberg as the *Mimosa nilotica* of Linn., has been ascertained to be a distinct species, and has received the name of *A. karroo*. Besides gum, the *A. vera* is said to have formerly furnished, from its unripe fruit, by expression and inspissation, the extract before alluded to, under the name of *acaciæ veræ succus*, as a product of the *A. arabica*.

It is probable that other species of acacia, not yet known to botanists, contribute to furnish the gum arabic of commerce. There are also many known species, from which gum exudes in considerable quantities, without being collected as an object of trade. Such is the *A. karroo* of the Cape of Good Hope, the gum of which is said to be sometimes employed by the natives for food in times of scarcity, and to be used at the Cape as a medicine. Such are, also, the *A. decurrens* and *A. floribunda*, which grow in New Holland, and afford a product analogous to gum arabic. The *A. lebbek*, a native of Egypt, is said by some authors to be among the gum-bearing species; but this is denied by Ehrenberg. M. Busseuil reports that there are several acacias in Chili, which yield a gum employed by the inhabitants in the place of gum arabic.

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A General System of Gardening and Botany; containing a complete Enumeration and Description of all Plants hitherto known: with their genuine and specific Characters, &c. &c. Founded upon Miller's Gardeners' Dictionary, and arranged according to the natural System. By George Don, F L.S. In 4 vols. Vol. IV. 4to. London: C. J. G. and F. Rivington.

The study of botany, and the branches of knowledge which are subsidiary to that science, may now be said to form a necessary part of general education in this country. For this, which we deem no unimportant advantage, we are in a great measure indebted to the policy which has recently begun to influence our medical corporations; for, by requiring from every candidate for the faculties which they confer, sufficient evidence of a certain proficiency in botany, these bodies have, by this time, succeeded in sending into every town, and almost every hamlet in the empire, a good practical botanist in the character either of physician, surgeon, or apothecary. The influence of such an agency has been prodigious. In all the large towns, and in a considerable number of the minor ones, Horticultural Societies are established. We have been astonished, when we read in the descriptions of the annual botanical exhibitions at various places throughout the country, the account of the occupations of the persons who contend for the prizes. In one place we have found the office of president of a Horticultural Society filled by a working weaver: the best and largest cherries in the West of England, one year, were the produce of the care and ingenuity of an industrious cotton spinner. Numerous, and indeed ludicrous, testimonies may be adduced to show the enthusiasm with which horticulture is pursued by all classes of the community. A worthy mechanic, in one of the manufacturing districts, lately turned the roof of his house into a kitchen garden, and kept his family in fresh vegetables during the entire season.

Hitherto the great obstacle to the cultivation of botany has been its nomenclature. At first sight, it would appear that an impediment of this nature was merely a pedantic wantonness, proceeding from that love of mystery which has so uniformly characterised the learned in all ages. But a few moments' reflection will satisfy all reasonable minds, that the technical language of botany, difficult to acquire as it may be, grows out of, and is inseparable from, the genius of the science itself. The study of it can never be located in any given country; its objects are as much Russian and German, or even African, as they are English. Botany allows no distinctions of territory; its field is the world of nature from pole to pole. Such being the case, it is obvious that the pursuit of botany must be carried on by infinite divisions, all of which are contributing to one common end. Hence a community of ideas between the botanists of one empire and those of another, becomes absolutely indispensable; and from this necessity springs that universal language which is fixed to no clime, but nevertheless is understood in every country.

We cannot, therefore, expect that this great difficulty will ever be removed; and it only remains for us to adopt such measures as may be best calculated to diminish it. For this purpose various contrivances have been resorted to, particularly in this country. Plans without number have been proposed and acted on, for the purpose of engaging the young mind in the pursuit of botany. A great deal of success has attended these efforts; for, after the employment of great labour and diligence, the mysterious veil in which this science had been so long wrapped, was drawn aside, and all its beauty exhibited familiarly to the contemplation of the unlearned. As one of the most important instruments for carrying on this great moral revolution, we have to notice the great work, of which the fourth volume is now before us. It certainly comes forth in the objectionable form of a costly publication; but when we come to consider the nature of its contents, we shall be satisfied that he who trusts exclusively to its pages for acquiring a competent knowledge of botany, will find that, in the long run, he will have but little grounds for self-accusation for having violated the strictest principles of economy.

DESCRIPTION OF THE PLATES.

TRIFOLIUM INCARNATUM.

CRIMSON TREFOIL.

Diadelphia Decandria.

Leguminosæ.

Gen. Char.—Legume (in general) shorter than the calyx, one or many-seeded, indehiscent, deciduous. Flowers more or less capitate.

Spec. Char.—Spikes oblong, villous, blunt, leafless. Leaflets roundish, obcordate, ovate, crenate, villous.

Of the annual species of *Trifolium* cultivated by the curious here, this is one of the largest, as well as one of the most shewy; the blossoms in the plants which we have had an opportunity of observing, have been of a bright crimson colour, and have therefore corresponded badly with the name of *incarnatum*, originally applied to the plant by some of the old botanists, and adopted by Linnæus; like other Trefoils with red flowers, the blossoms are doubtless found with different shades of colour, and sometimes wholly white.

It is a native of Italy; a hardy annual, cultivated here by Parkinson in 1640. Flowers in July, and readily ripens its seeds, by which it is easily raised.

ERICA AITONII.

AITOUS HEATH.

Octandria Monogynia.

Ericeæ.

Spec. Char.—Anthers beardless. Leaves 3. Flowers terminal. Bracteas remote. Corolla viscid.

Stem shrubby, rising to the height of several feet, together with the branches, slender, and requiring support. Leaves for the most part in threes, upright, and rather pressed to the stalk, somewhat linear, bluntish, slightly mucro, glossy, and extremely viscid, having a groove down the middle of each. Base pale green. Flowers terminal, about three or four. Peduncles red. Calyx extremely glossy and glutinous, with a groove down the middle of each segment. Tube of the corolla an inch or more in length, cylindrical, a little enlarged at the top, striped with red lines, and somewhat fluted. Limb very large, at first white, changing to a pale red, divided into four segments, which are ovate and obtuse. Stamina within the tube. Stigma projecting a little beyond it.

Is propagated by cuttings, but as yet is very rare.

SEMPERVIRUM ARACHNOIDEUM.

COB-WEB HOUSE-LEEK.

Dodecandria Dodecagynia.

Gen. Char.—Calyx 12-parted. Petals twelve. Capsules twelve, many-seeded.

Spec. Char.—Leaves with entangled hairs. Offsets round.

It has a much shorter and narrower head than the common *House-leek.* The heads are small and very compact. Leaves gray, sharp-pointed, and have slender white threads crossing from one to the other, intersecting each other in various manners, so as in some measure to resemble a spider's web. Flower-stalks about six inches high, succulent and round, having awl-shaped, succulent leaves placed on them alternately; the upper part divided into two or three branches, upon each of which is a single row of flowers ranged on each side; each composed of eight lanceolate petals, of a bright red colour, with a deep red line running along the middle; they spread open in form of a star; and in the centre are the germs, of an herbaceous colour, surrounded by sixteen purple filaments, terminated by yellow anthers.

Like most of the House-leeks it is best kept in a pot, or it will grow well and appear to great advantage, on a wall or piece of rock-work; the more it is exposed to the sun, the more colour will enliven its stalks and foliage, and the more brilliant will be its flowers; the latter make their appearance in July.

It is propagated by offsets, which it sends forth in abundance. It is no uncommon practice to treat this beautiful species of House-leek as a native of a warm climate; under such an idea we have seen it nursed up in stoves, while the plant spontaneously braves the cold of the Switzerland Alps.

ANTIRRHINUM VISCOSUM.

CLAMMY TOAD-FLAX.
Didynamia Angiospermia.
Scrophularineæ.

Gen. Char.—Calyx 5-leaved. Corolla not spurred, gibbous at base; the upper lip bifid, reflexed; lower trifid, closed by the prominent palate. Capsule oblique at base, without valve, opening at the end by three pores.

Spec. Char.—Cauline leaves linear, alternate, radical, lanceolate, quaternate.

It grows to about the same height as the *Antirrh. sparteum,* has a stouter and more upright stem, covered with more numerous hairs; its flowers are larger than those of the *sparteum,* more parti-coloured, and have a greater affinity to those of our common Toad-flax; in their form we may trace something of the similitude of a bird's head: the calyx is remarkable as to the form of its leaves.

It is an annual of ready growth, and flowers in July.

Its seeds should be sown about the beginning of April, in small patches, on the borders where the plants are intended to remain; when the seedlings come up, they should be thinned, and left at the distance of two or three inches from each other.

LAVENDULA DENTATA.

TOOTHED-LEAVED LAVENDER.
Didynamia Gymnospermia.
Labiatæ.

Gen. Char.—Calyx ovate, somewhat toothed, supported by a bractea. Corolla resupinate. Stamens within the tube.

Spec. Char.—Leaves sessile, linear, pectinate-pinnate. Spike contracted, comose.

There are few tender plants that have been so long cultivated in our gardens as this; we find it figured in Gerard, who observes that it must be covered in the winter from cold, or else set in pots or tubs with earth, and carried into houses; thus did they preserve their tender plants before the introduction of green-houses.

Miller has given a very good account of this plant, which we cannot do better than copy, just observing that he describes the leaves as of a grayish colour, which they can scarcely be said to be, especially if contrasted with those of the *pinnata,* and which he had never seen.

"The *dentata* grows naturally in Andalusia in Spain, and also about Mercia; this has a ligneous stalk, which rises two or three feet high, furnished with branches on every side, which are four-cornered, and garnished with leaves placed opposite by pairs, indented regularly on both sides, almost to the midrib, in form of winged leaves; they are of a grayish colour, have a pleasant aromatic odour, and biting warm taste. The flowers are produced in scaly spikes at the end of the branches, standing upon long naked footstalks; they are four-cornered, hairy, and about an inch long, terminated by a few purplish leaves, in the like manner as the other sorts, which incline me to keep it joined to them; it flowers great part of the summer, but the seeds very rarely ripen in England. It is propagated by slips or cuttings."

PERSOONIA LINEARIS.

LINEAR-LEAVED PERSOONIA.
Tetrandria Monogynia.
Proteaceæ.

Gen. Char.—Calyx 4-leaved, regular, the segments having the stamens in their middle, recurved at end, and deciduous. Stamens exserted. Glands four, hypogynous. Ovary stalked, 1-celled, 1-2 seeded. Stigma obtuse. Drupe berried, with a 1-2 celled nut.

Spec. Char.—Leaves linear, mucronate, rather villous. Flowers axillary, solitary.

It is a hardy greenhouse shrub. Native of New South Wales; growing about five feet high, and continuing to produce an abundance of yellow flowers through the autumnal months. It is propogated either by cuttings or seeds, which it produces freely with us; and should be planted in peat earth.

SALVIA INDICA.

INDIAN SAGE.
Diandria Monogynia.
Labiatæ.

Gen. Char.—Corolla ringent. Filaments stalked, crosswise. Seeds naked.

Spec. Char.—Leaves cordate, rather lobed at the side; the upper sessile. Whorls nearly naked, very distant.

Though a native of India, as its name implies, this magnificent species of sage is found to be a very hardy herbaceous plant, requiring, indeed, a little extraordinary care to be taken of it in severe winters. It will grow to the height of four or five feet, and produce, during the months of June and July, abundance of flowers, singularly and beautifully marked.

It may be increased by parting its roots in the autumn or spring; and also by seed.

The beauty of tall plants, like the present, depends greatly on the pains taken in sticking them; this business in general is not sufficiently attended to, being frequently deferred till it becomes a matter of necessity rather than of choice; we would therefore recommend it to our readers to set about it early, soon after the plant emerges from the ground, especially in respect to all those which are furnished with tendrils, or have twining stalks; the due execution of this work requires judgment, and will admit the display of some taste.

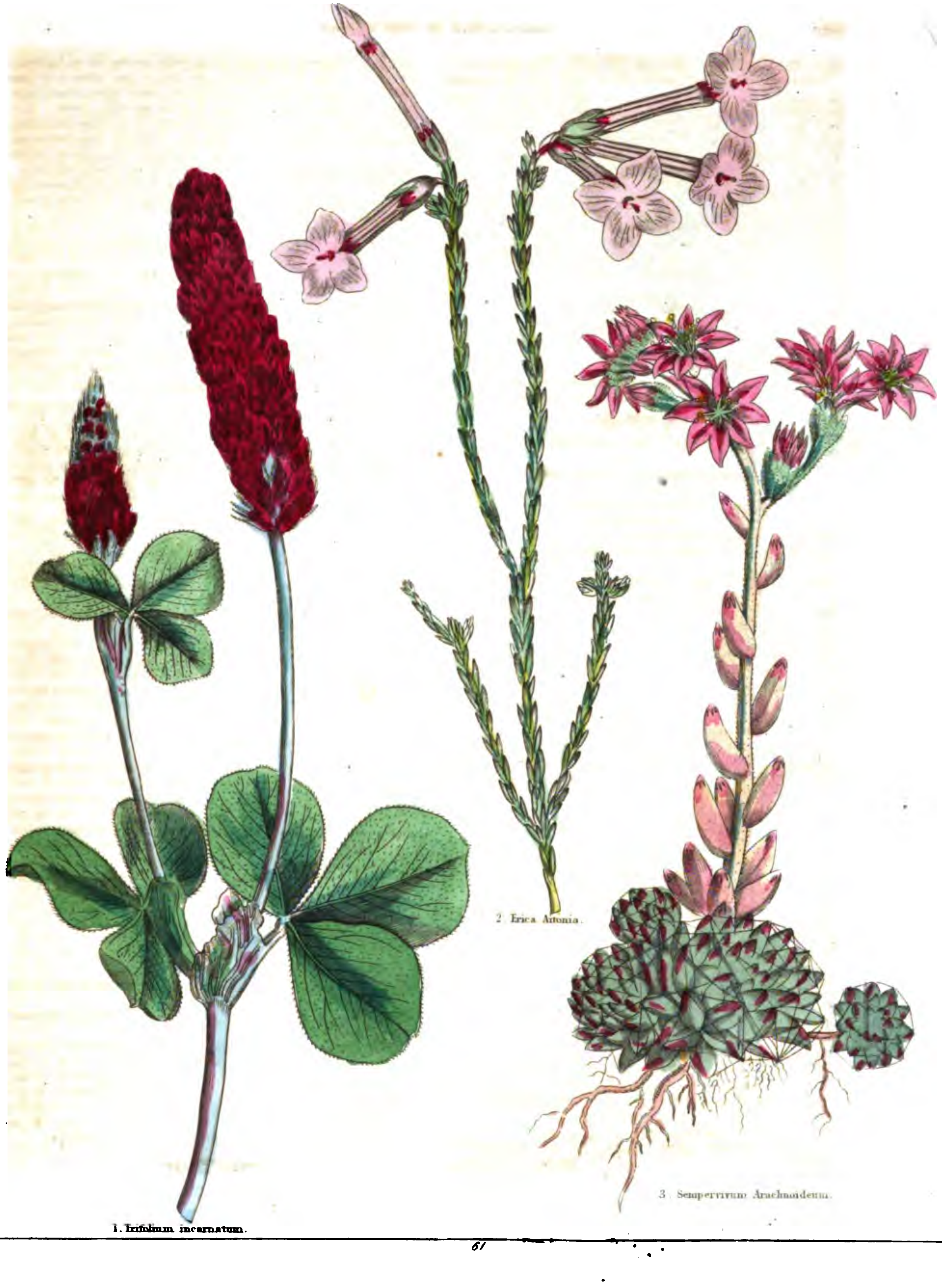
XERANTHEMUM SESAMOIDES.

STRAW-COLOURED XERANTHEMUM.
Syngenesia Polygamia Superflua.
Compositæ.

Gen. Char.—Receptacle paleaceous. Pappus setaceous. Calyx imbricated, radiated, with a coloured ray.

Spec. Char.—Leaves acerose, linear, keeled, smooth, appressed. Branches 1-flowered. Flowers sessile.

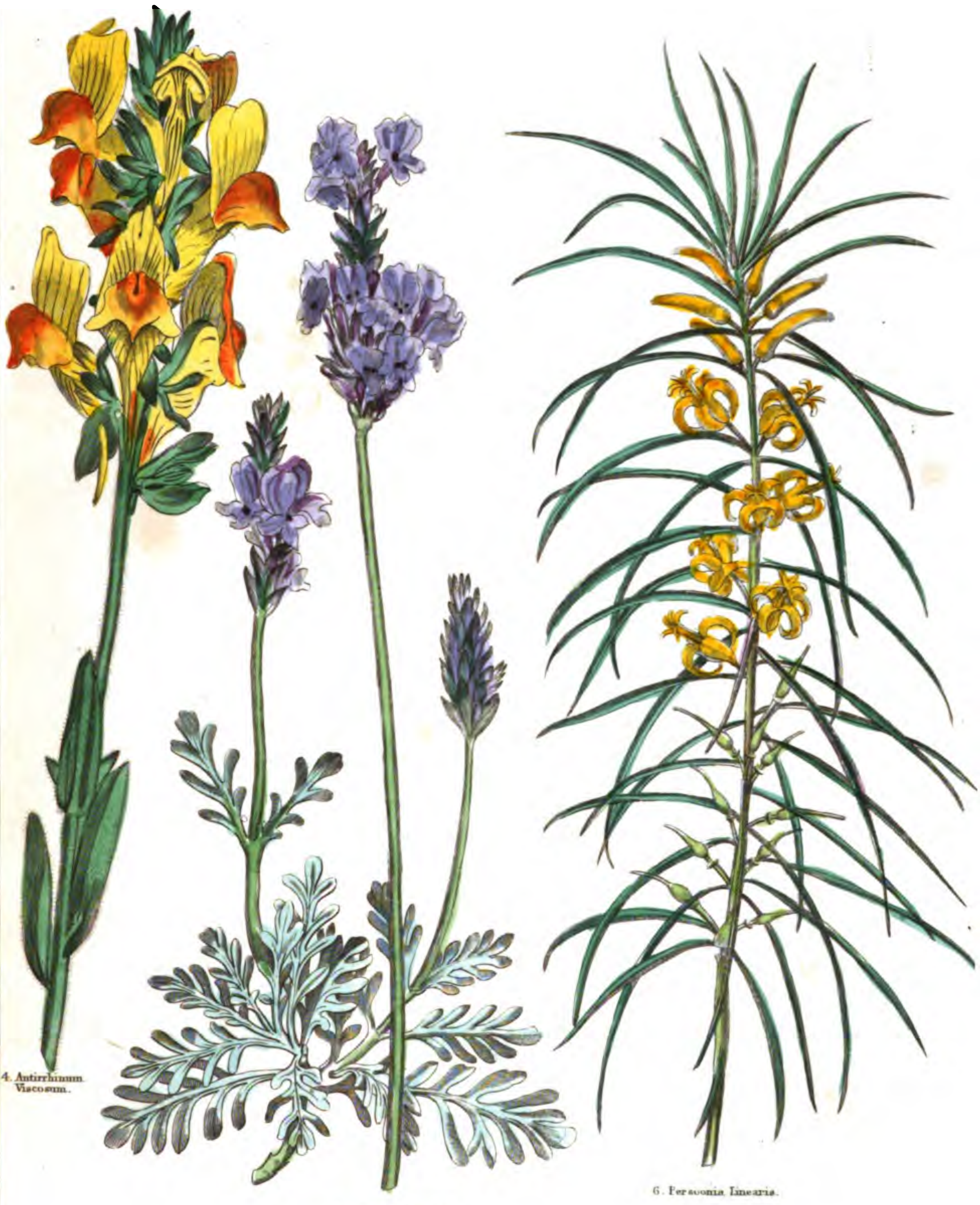
The leaves of all the varieties *Xeranthemum sesamoides* are fasciculated, in some degree resembling those of some species of pine tree; upon the branches they are very short, closely adpressed to the stalk, and as it were glued thereto by the woolly pubescence. The sort with sulphur or straw-coloured flowers is as elegant as any. Is a native of the Cape. Blows freely most of the summer, and is increased by cuttings.



1. Trifolium incarnatum.

2. Erica Aitonia.

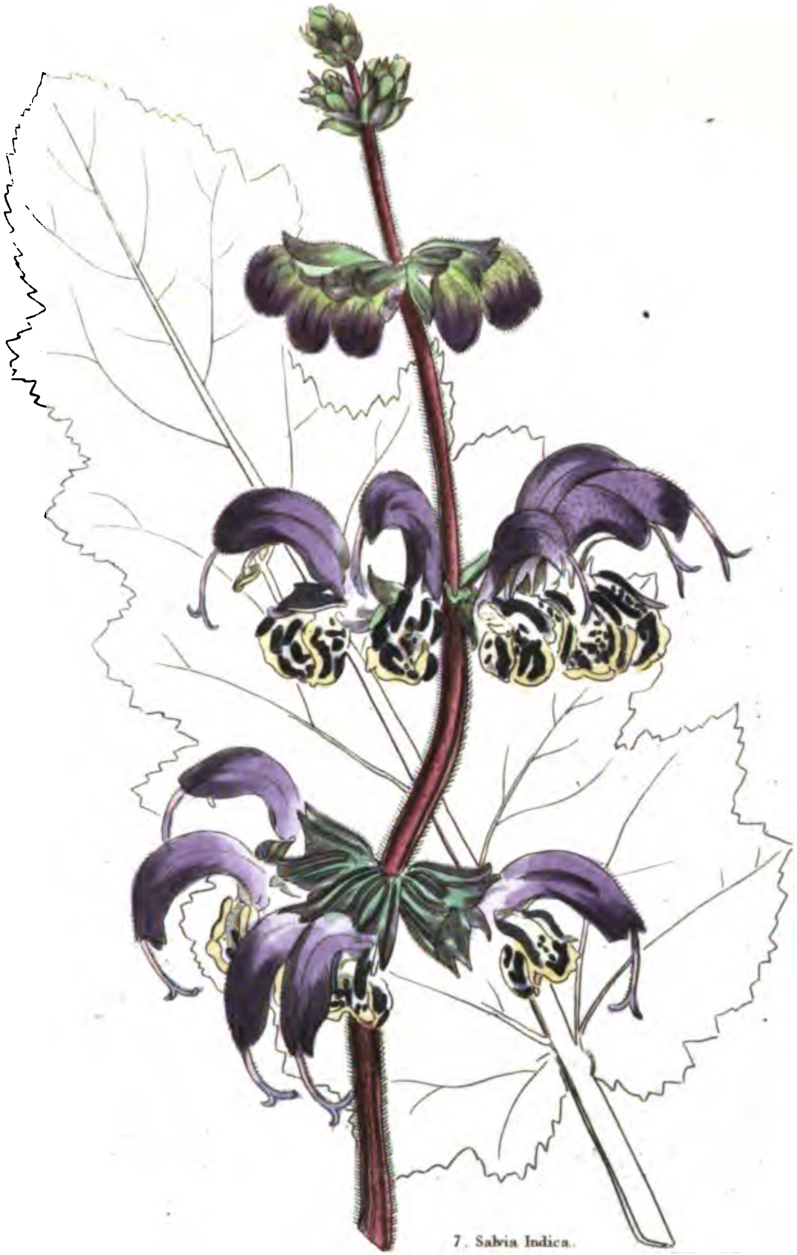
3. Sempervivum Arachnoideum.



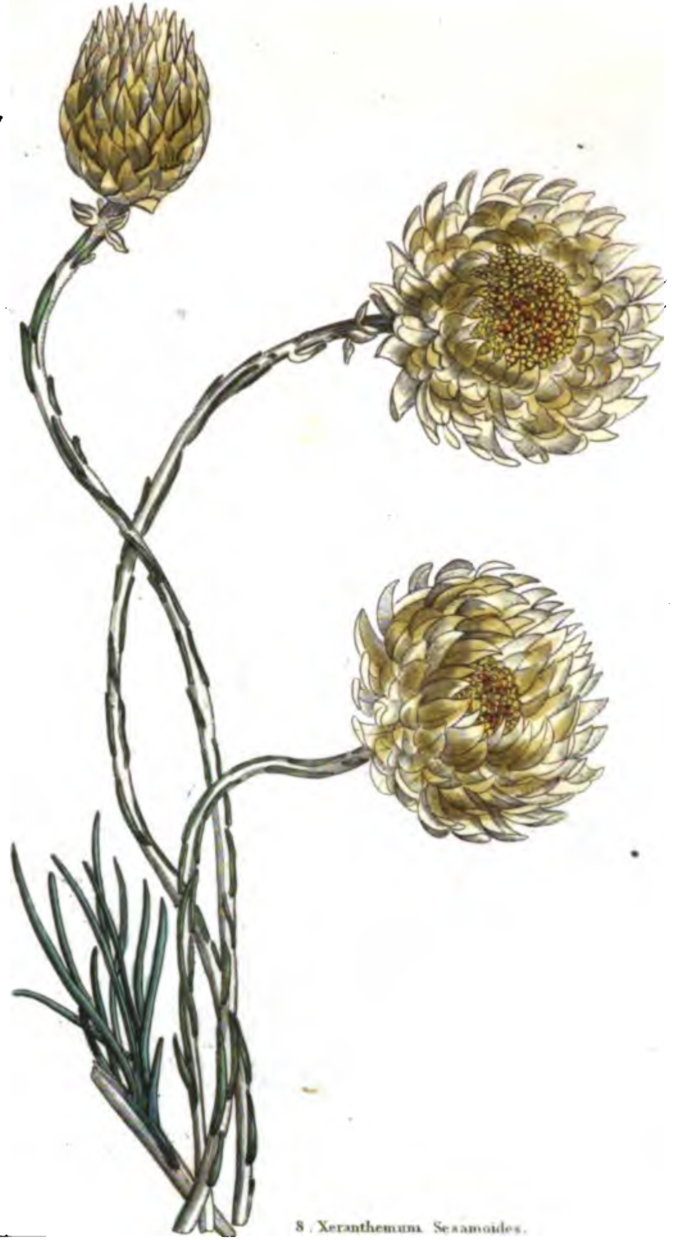
4. Antirrhinum Viscosum.

5. Lavandula dentata.

6. Persoonia Linearia.



7. Salvia Indica.



8. Xeranthemum Sesamoides.

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MAGAZINE OF BOTANY, GARDENING,
AND
AGRICULTURE,
BRITISH AND FOREIGN.

OCTOBER, 1836.

THE CHERRY.

The Cherry is a middle-sized tree, with ash-coloured, shining, roundish branches, ovate, serrated leaves, and white flowers, produced in umbellate fascicles, and succeeded by a red drupe with an acid pulp. The leaf and flower buds are distinct, the former terminal, the latter produced from the sides of the two or more year's old branches. The cultivated *cherry* is said to have been first introduced into Italy by Lucullus, in 73, A. C., from a town in Pontus in Asia, called *Cerasus*, whence the generic-name, and was introduced to Britain 120 years afterwards. Many suppose that the *cherries* introduced by the Romans into Britain were lost, and that they were re-introduced in the time of Henry VIII. by Richard Haines, the fruiterer to that king.

But though we have no proof that *cherries* were in England at the time of the Norman conquest, or for some centuries after it, yet Warton (a diligent and ingenious antiquary) has proved by the following quotation from Lydgate, a poet who wrote about or before 1415, that the hawkers in London were wont to expose *cherries* for sale, as is now done, early in the spring.

> "Hot pescode ówn (one) began to cry,
> Straberys rype, and cherries in the ryse."

The tree is now very generally cultivated, both as a wall and standard fruit, and has been forced for upwards of two centuries. The *cherry* is a refreshing summer fruit, highly grateful at the dessert, and affording pies, tarts, and other useful and elegant preparations in cookery and confectionary.

Dried cherries are much esteemed for winter puddings, and the *wine* made from this fruit much resembles the red Constantia, both in colour and flavour. The small *black cherries*, with good brandy, produce one of the most wholesome and agreeable liquors. *Eau de cerises* is an admired liqueur of France.

The *gum* which exudes from this tree is equal to gum Arabic; and Hasselquist relates, that more than one hundred men, during a seige, were kept alive for nearly two months without any other sustenance than a little of this gum taken sometimes into the mouth and suffered gradually to dissolve.

The *wood* of the *cherry* tree, which is hard and tough, is next to oak for strength, and comes the nearest to mahogany in appearance: it is in much request by the turners in making chairs, &c.

Judiciously planted, the *cherry* tree is very ornamental in a shrubbery, its early white blossoms contrasting with the sombre shades of evergreens in the spring, and its graceful ruby balls giving a pleasing variety in the summer.

Varieties.—The *cherry*, like many other kinds of fruits, has had its sorts so multiplied, by various graftings and sowing the seeds, that we now enjoy a great variety of this agreeable fruit, and for a considerable portion of the summer, as it is one of the first trees that yields its fruit in return for the care of the gardener.

From the ripening of the *Kentish* and the *May Duke*, to the *yellow Spanish* and the *Morello*, we may reckon full one third of the year that our desserts are furnished with this ornamental fruit; and to those who have the advantage of housed trees, the *cherry* makes a much earlier appearance, as it is a fruit that bears forcing exceedingly well.

The *cherry*, Mr. J. H. Knight observes, "sports more extensively in variety when propagated from seeds, than any other fruit which I have hitherto subjected to experiments; and this species is therefore probably capable of acquiring a higher state of perfection than it has ever yet attained. New varieties are also much wanted; for the trees of the best old kind are every where in a state of decay in the *cherry* orchards; and I am quite confident that neither healthy nor productive trees will ever be obtained from grafts of old and expended varieties of this or any other species of fruit tree."

The Romans had eight sorts: red, black, tender-fleshed, hard-fleshed, small, bitter-flavoured, and a dwarf sort. Tusser, in 1573, mentions cherries red and black. Parkinson mentions thirty-four sorts, Ray twenty-four sorts, and Miller has eighteen sorts, to which he says others are continually adding, differing little from those he has described. The catalogue of the Luxembourg contains forty-two, and the catalogue of the London Horticultural Society (1832) two hundred and nineteen sorts, the greater part of which are not well known.

The French divide their *cherries* into *griottes*, or those belonging to the present species; *bigarreau* or hard-fruited *cherries*, the Cerasus *duracina; merisiers*, or wild *cherries*, the Cerasus *avium;* and *guignes* or *geans*, the Cerasus *Juliana*.

Among the best varieties (of *C. caproniana*) are the following, of which some have been imported.

1. The *early May cherry*, which is first ripe; therefore a place may be given it, where there is room. The fruit is small, round, red, and acid. Flesh watery. It ripens the middle of June.

2. The *May Duke*. This ripens next. It is certainly one of the best dessert cherries, when all its properties are taken into consideration. The fruit is middle-sized, heart-shaped, obtuse. Flesh tender. It answers well either as a wall or standard fruit.

3. The *Arch Duke* comes after the *May Duke*, and if permitted to hang till it is ripe, is an excellent cherry. It should not be gathered before midsummer, and may hang a fortnight longer, even near London, where it ripens a fortnight sooner than in places forty miles distance. Against a north wall this fruit may be continued till August.

4. The *Flemish*. A first-rate kitchen fruit, ripening in July. The fruit is round, red, middle-sized. Flesh watery. Does well as a standard.

5. The *Kentish*, or *common red*, is a good bearer and a first-rate kitchen fruit, ripening the end of July. The fruit is middle-sized, round, and red. It does best as a standard.

6. The *white heart* is a second-rate dessert fruit, ripening

early in July. The fruit is heart-shaped, pale yellow, and red. Flesh tender.

7. The *carnation*. Valuable for coming late in July. It is very firm and fleshy, but not the best bearer; will ripen very well on espaliers. The fruit is large, round, pale red. Flesh tender.

8. The *Morello*. A first-rate kitchen fruit, generally planted against a north wall, and used for preserving; but in a better aspect, and suffered to hang till ripe, is a very good fruit for the table. The fruit is large, round, heart-shaped, and of a dark red. Flesh very tender.

Estimate of sorts.—Forsyth recommends for a small garden: 1. *May Duke*. 2. *Morello*. 3. *Arch Duke*. 4. *Black heart*. 5. *Bigarreau*. 6. *Graffion*. 7. *Turkey heart*. 8. *Kensington Duke cherry*.

All the sorts of *cherries* which are usually cultivated in fruit gardens, are propagated by budding or grafting the several kinds into stocks of the black or wild red *cherries*, which are strong shooters, and of longer duration than any of the garden kinds. The stones of the wild *cherries* are sown in a bed of light sandy earth in autumn (or are preserved in sand till spring, and then sowed). The young stocks should remain in the nursery beds till the second autumn after sowing; at which time prepare an open spot of good fresh earth, well worked. In October plant out the young stocks at three feet distance row from row, and about a foot asunder in the rows, being careful, in taking them up from their seed-beds, to loosen their roots well with a spade, to prevent their breaking; prune their roots; and if they are inclinable to root downwards, shorten the tap root, but do not prune their tops.

The second year after planting out, if they take to growing well, they will be fit to bud, if they are intended for dwarfs: but if they are for standards, they will not be tall enough until the fourth year; for they should be budded or grafted near six feet from the ground, otherwise the graft will not advance much in height; so that it will be impossible to make a good tree from such as are grafted low, unless the graft is trained upward

The usual way with the nursery gardeners is to bud their stocks in winter, and such of them as miscarry they graft the succeeding spring. Those trees where the buds have taken, must be headed off in the beginning of March, about six inches above the bud; and when the bud hath shot in summer, if there be any apprehension of its being blown out by the winds, it must be fastened with bass, or other soft tying, to that part of the stock which was left above the bed. The autumn following these trees will be fit to remove; but if the ground be not ready to receive them, they may remain two years before they are transplanted; in doing which observe not to head them, for this very often is immediate death to them; but if they survive, they seldom recover for four or five years.

If these trees are intended for a wall, plant dwarfs between the standards; but the latter, as the former fill the walls, must be cut away to make room for them. But never plant standard *cherries* over other fruits, for there is no other sort of fruit that will prosper well under the drip of *cherries*.

When these trees are taken up from the nursery, shorten their roots, and cut off all the bruised parts, as also all the small fibres, which would dry, grow mouldy, and be a great prejudice to the new fibres in their coming forth; cut off likewise the dead part of the stock which was left above the bud, close down to the back part of it, that the stock may be covered by the bud. If these trees are designed for a wall, place the bud directly from the wall, that the back part of the stock which was cut may be hid from sight. *The soil* that *cherries* thrive best in is a fresh hazel loam; but if it be a dry gravel, they will not live many years, and will be perpetually blighted in the spring.

In Kent this tree prospers in a deep loam, incumbent on a rock. If the soil be defective, it may be amended by the addition of some virgin earth, light loam, and rotten dung, or other manure called for by the nature of the staple.

Allot to the finest of the early kinds south walls for fruit in May and June, train others against west and east walls, for supplies in succession, and some on north walls for the latest ripeners, particularly the *Morello*, which so situated, will continue in perfection till September and October; but it is also proper to plant some trees of this sort on south walls, to have their fruit ripen earlier, with an approved flavour.

Final Planting.—Plant full standards from twenty to thirty feet apart; small standards fifteen, eighteen, or twenty feet apart. The proper *season* for planting is from the middle or end of October, or any time in November or December, if open weather, till February or March. Train the present branches to the wall chiefly at their full length, ranged horizontally from three to six inches asunder. As the branches increase in length, lay them along without shortening, as far as there is room for them to extend: in default of room only, prune such as are running out of limits to some lateral fruit buds. Two or three occasional waterings in the dry warm weather of spring and summer will promote the striking of trees newly planted.

Cherry trees in general produce the fruit upon small spurs or studs, from half an inch to two inches in length, which proceed from the side and ends of the two-year or three-year and older branches; and as new spurs continue shooting from the extreme parts, it is a maxim in pruning both standard and wall trees, not to shorten the bearing branches where there is room for their regular extension. The *Morello* is in some degree an exception.

Pruning Cherry trees in general.—To *standards* give only occasional pruning, to remove any casual irregularity from cross-placed or very crowded branches; and take away all cankery and decayed wood.

To *wall* trees, a summer pruning, to commence in May and June, is necessary to regulate the shoots of the same year. Disbud the superfluous and foreright shoot; or if they have been suffered to spring, pinch or cut them off, with such as are disorderly. Retain a competent supply of some of the best well placed side and terminal shoots, to remain for selection at the winter pruning. Nail or lay in the reserve close to the wall, at their full length, and so train them all summer.

The *winter pruning* may be performed at the fall of the leaf, or at any time in moderate weather till February or March. It comprises a regulation both of the old and young wood. Carefully preserve the sound productive branches and bearers in their full expansion; and reduce or remove such only as are irregular in growth, too crowded, unfruitful, decayed, or cankery. Any branches extending out of bounds, prune in to some good lateral shoot or fruit bud. According to the time the bearers have already lasted, look to some promising shoots, for successors to those which may first wear out. To fill immediate vacancies, retain select shoots of last year, and the year before, with uniformly a leader to the advancing branch where there is room, and with lateral shoots in any open or unproductive space nearer the origin of the branch, to be trained as bearers between the main branches. Some cut superfluous fruit shoots clean away; others leave a sprinkling of short stubs, cut very short if foreright. The new laterals and terminals are to be trained in at full length, as far as room will permit. They will come into bearing the first and second year.

In pruning *cherry* trees in general, be careful to preserve the small clustering fruit spurs, except where in wall trees any old spurs project considerably, and assume a rugged disorderly appearance: cut such clean out smoothly.

Pruning the Morello cherry.—The Morello cherry bears principally on the shoots of last year, the fruit proceeding immediately from the eyes of the shoots, and bears but casually, and in a small degree, on close spurs formed on the two-year old wood, and hardly ever on wood of the third year. Therefore, both in the summer and winter pruning leave a supply of last year's shoots on all the branches, from the origin to the extremity of the tree, for next year's bearers, cutting out past bearers to make room. It is plain that the *Morello* ought to have no stubs left with a view to spurs, and all foreright shoots ought to be disbudded while young. To leave a convenient place for young wood, train the present bearers six inches apart; lay in between each of these one young shoot for bearing next year, which will make the promiscuous distance three inches.

Protection from birds.—As *cherries* in the ripening state are frequently attacked by birds, it is advisable to have choice wall trees or espaliers defended with large nets in due time. Old fishing nets may also be spread over the branches of dwarf standards. To protect other standard trees, let scare-crows and clap-boards be put up.

Gathering the fruit.—Use the hand, taking hold of the fruit stalk in gathering from the walls, and the cherry gatherer, in gathering from the distant branches of high standards.

Insects and diseases.—Our cherry trees, both in the open air and on the natural walls, particularly the tops of young shoots, are much attacked with a small black insect, provincially called the *black beetle.* The remedy I have found most effectual for their destruction is a mixture of pitch with one-sixteenth part of powdered orpiment, one-sixteenth part of sulphur, dissolved over a slow fire in an earthen pipkin, until they be well incorporated; when cold, divide it into small pieces, about the size of a hen's egg, and burn it under the trees with damp straw, directing the smoke as much as possible where the insects are most numerous. In an hour afterwards, if the state of the fruit will admit, give the tree a good washing with a garden engine, which generally clears off the half dead beetles, and prevents the spreading of the red spider.

Of the culture of the cherry house.—No tree *forced* for obtaining fruit early, is more liable to fail of a good crop than the cherry; the blossoms are apt to fall off before the fruit is set, and the fruit will keep falling off before and after they are as large as peas. This is occasioned by a kind of stagnation of air about them, which affects the tender blossoms and young shoots.

Ripe fruit is obtained in April, by beginning to force at the beginning of January; or three weeks later, by commencing a month later. The May Duke is the best sort to force; the other early kinds do not set their fruit so well under artificial heat. The *Morello* will bear well in a house; but it is not general to force it. The plants may be either planted in the border of a house, worked by fire heat, and trained to the wall or a trellis: or dwarf standards may be introduced in large pots or tubs, twelve or fifteen inches in diameter. A light sandy loam, moderately rich, forms a proper soil for the border: but plants in cradles require a greater proportion of vegetable mould, or black impalpable matter in the compost. Principal wall trees for the back border may have been trained one or two years; riders three or four years. Where the whole bottom space of a forcing house is prepared as a border or bed, dwarf standards with the lowest stems may be planted in front, and other dwarfs rising gradually higher towards the back part; choosing such as are fully furnished with immediate bearing branches, fruit spurs, and blossom buds: and if any top shoots are too extensive, prune them to order, cutting to some principal fruit buds.

Temperature.—Begin at 40 deg. Fahrenheit; and throughout the first week, let the minimum be 40 deg., and the maximum 42 deg., giving plenty of air. By gradual advances in the second, third, and fourth week, raise the course to 42 deg. min.—45 deg. max. In strong sunshine, admit air freely, rather than have the temperature above 52 deg., by collecting the warm air. In the fifth and sixth week, the artificial minimum may be gradually elevated to 45 deg., but the maximum should be restrained to 48 deg. from fire heat, and to 55 deg. from sun heat, until the plants are in flower. After the blossoms are shown, and until the fruit is set, aim to have the heat from the flues at 48 deg. min.—52 deg. max. At this stage, maintain as free an interchange of air as the weather will permit: and when the sun heat is strong, do not let the temperature within exceed 60 deg.

As the fruit is to be swelled and ripened, the requisite heat is 60 deg. min.—65 deg. max.

In forcing the *cherry,* it is essential to continue a free renovation of air; always sustaining the minimum heat in the different stages. The blossoms will sometimes fall abortive, or the young fruit drop off after setting, from no other cause than a stagnant atmosphere.

The plants must be watered moderately at the root, as the state of the mould may require. Twice or thrice a week syringe the branches; but from the time the flowers open, till the fruit be well set, steam the flues instead of watering over head.

The *cherry* is sometimes forced by bark-bed heat in a glazed pit; and sometimes by a dung hot-bed in such a pit.

Forcing by a temporary structure.—Torbon observes, that "where a portion of wall (especially with a southern aspect) already well furnished with May Dukes perfectly established and in a bearing state, can be spared for forcing, a temporary glass case may be put up against it; the flue may be built on the surface of the border, without digging or sinking for a foundation; neither will any upright or front wall be requisite; the wooden plate on which the lower end of the rafters are to rest, may be supported by piles sunk or driven into the soil of the border, one pile under every or every alternate rafter. The place between the surface and the soil, should be filled by boards nailed against the piles, to exclude the external air; for the plate must be elevated above the level of the surface, from eighteen to thirty inches, or whatever height may be sufficient to let the sashes slip down in order to admit fresh air. I believe this to be an uncommon structure, and it may perhaps be objected to; but I am confident it will suit well for cherries, for I have constructed such places even for forcing peaches, with good success, as well as for maturing and preserving a late crop of grapes."

CULTIVATION OF RANUNCULUSES IN POTS.

Having been very successful in flowering ranunculuses in pots the past winter, and having, also, often been asked what course I pursued to bloom them so well, I send you a few hasty remarks, which, if you think they are of sufficient importance to be of any benefit to your readers, you are at liberty to use them as you please.

For two or three years I have planted ranunculuses in pots or boxes, but have never succeeded in procuring but few flowers, and those very inferior. The roots that were planted were large and strong, and the soil such as is generally recommended for them to be grown in. Being a favourite flower with me, I could not be induced to give them up without further trial. In all the directions that I have ever read for planting ranunculuses, shallow pots or boxes have been recommended; but as in these they did not flourish, I came to the conclusion that the little soil that was generally allowed for them to grow in, was not sufficient for the purpose. In planting beds, it is particularly stated that the soil should be loosened to the depth of *eighteen* or *twenty inches,* as their roots run to a considerable length; from this hint, and from the fact that bulbous roots like a deep pot to produce large and full formed flowers, I selected several hyacinth pots, which are made about ten inches deep and six wide at the top. In these the roots were planted early in the month of January in a good compost mixed together in nearly the following proportions:—one half good fresh loam and the other half old hot-bed manure.

After they were set out they received a good watering, and the pots were placed away in front of the greenhouse, underneath the hot-water pipes, where they received but little light; in the course of three weeks or a month the shoots began to make their appearance above the soil, and the pots were then removed on to a shelf above the pipes, where they could have the benefit of the light of both the roof and front sashes. They here made a vigorous growth, producing fine large green leaves, and throwing up in the course of a month, flower buds exceedingly stocky and strong; in some of the pots I counted upwards of twelve. From the time they were placed upon the shelf they received large quantities of water, and one or two of the front sashes, against which they stood, in all mild weather were opened to prevent the plants from being drawn up. With only this attention they continued to advance their flower stems until April, when they blossomed finely, and presented a most beautiful display; some of the stems were more than a foot in height, and proportionably strong; many who saw them were astonished at their vigour. After their flowers had fallen, the roots were turned out, as, when forced, they are not worth growing afterwards.

At the time the roots were planted, two of the pots were immediately removed to a small house, which was kept to the temperature of about 60 degrees, and placed upon a stage in rather a shady situation; they soon began to grow, and were considerably in advance of the others in the greenhouse; but the foliage was not so large, nor the flower stems so numerous, tall, or strong; the colour of the flowers was also less brilliant, and they continued in beauty a less length of time. Like hyacinths and other bulbs, they require to be planted and kept away from heat and light until the roots have struck deep into the soil, so as to afford nourishment as soon as they are brought into these elements again; separate from the depth of soil in the pots, I attribute the strong growth of the plants to the long time they were allowed to remain underneath the front stage unexposed to the light. Should these few remarks be the means of extending the cultivation of this beautiful plant in pots, I shall feel much gratified; and, at the same time, it would give me much pleasure to hear from some of your correspondents, the best mode of growing them in beds in the open garden. T. R.

BARILLA.

Barilla is a kind of Spanish alkaline salt used in the glass trade. It is procured by burning to ashes several plants of the kali kind. It is brought over in brown speckled masses, without smell, and strongly alkaline.

There are four plants which, in the early part of their growth, bear so strong a resemblance to each other, that they would deceive any but the farmer or the critical botanist. These four are barilla, gazul, soza, and saliconia, or salicar. They are all burnt to ashes, but applied to different uses, being possessed of different qualities. Some of the farmers mix more or less of the three last with the first; and it requires a complete knowledge of the colour, taste, and smell of the ashes, to be able to detect their knavery.

Barilla is sown afresh every year. Its greatest height above ground is four inches; each root pushes out a vast number of little stalks, which again are subdivided into smaller sprigs, resembling samphire, and altogether form a large spreading bush. The colour is bright green; as the plant advances towards maturity, this colour gradually changes to a dull green, tinged with red.

Gazul bears the greatest affinity to barilla, both in quality and appearance. The principal difference consists in its growing on a still drier, salter earth, consequently it is impregnated with a stronger salt. It does not rise above two inches out of the ground, spreading out into little tufts. Its sprigs are much flatter and more pulpy than those of barilla, and are more like samphire. It is sown best once in three, four, or five years, according to the nature of the soil. Soza, when of the same size, has the same appearance as gazul, but in time grows much larger, as its natural soil is a strong salt marsh, where it is found in large tufts of sprigs, treble the size of barilla, and of a bright green colour, which it retains to the last. Salicor has a stalk of a deep green colour, inclining to red, which last becomes by degrees the colour of the whole plant. From the beginning it grows upright, and much resembles a bush of young rosemary. Its natural soil is on the declivities of hills, near the salt marshes, or on the edges of the small drains or channels cut by the husbandmen, for the purpose of watering the fields; before it has acquired its full growth, it is very like the barilla of those seasons in which the ground has been dunged before sowing. In those years of manuring, barilla, contrary to its usual nature, comes up with a tinge of red, and when burnt, falls far short of its wonted goodness, being bitter, more impregnated with salt than it should be, and raising a blister if applied for a few minutes to the tongue. Barilla contains less salt than the others; when burnt, it runs into a mass resembling a spongy stone, with a faint cast of blue. Gazul, after burning, comes as near barilla in its outward appearance, as it does while growing in its vegetable form; but if broken, the inside is of a deeper and more glossy blue. Soza and Salicor are darker, and almost black within, of a heavier consistence, with very little or no sign of sponginess. All these ashes contain a strong alkali, but barilla the best and purest, though not in the greatest quantity. Upon this principle it is fittest for making glass and bleaching linen; the others are used in making soap. Each of them would whiten linen; but all except barilla would burn it. A good crop of barilla impoverishes the land to such a degree, that it cannot bear good barilla a second time, being quite exhausted. For this reason, the richer farmers lay manure on the ground, and let it lie fallow for a season, at the end of which it is sown afresh without any danger, as the seeds that have sprung up in the year of rest have carried off all the pernicious effects of the dung. A proper succession of crops is thus secured, by manuring and fallowing the different parts of the farm, each in their turn. The poorer cultivators cannot pursue the same method, for want of capital.

The pot ashes, when imported from Spain, are inferior in goodness to those of the Levant, called *pulverine* when loose, small, and in powder, and *rochetta* when in hard rocky lumps. The frit made of these becomes fine and clear crystal glass, especially that from the rochetta or the pulverine in lumps; but the barilla of Spain, though it be usually fatter, yet makes not a glass so white, but usually inclining to a bluish colour. The method in making barilla is the same as that followed in Britain in burning kelp. The plant as soon as ripe is plucked up, and laid in heaps, and then set on fire. The salt juices run out below into a hole made in the ground, where they run into a nitrified lump, which is left about a fortnight to cool. An acre may give about a ton.

BARK.

Bark, in the anatomy of plants, is that exterior coat of trees corresponding to the skin of an animal. As animals are furnished with a paniculus adiposus, usually replete with fat, which invests and covers all the fleshy parts, and screens them from external cold, so plants are encompassed with a bark replete with fatty juices, by means whereof the cold is kept out, and in winter the spiculæ of ice prevented from fixing and freezing the juices in the vessels; whence it is that some sorts of trees remain evergreen all the year round, their barks containing more oil than can be spent and exhaled by the sun, &c. The bark has its peculiar diseases, and its insects peculiar to it. It appears from the experiments of Buffon, that trees stripped of their bark the whole length of their stems, die in about three or four years. But it is very remarkable that trees thus stripped in the time of the sap, and suffered to die, afford heavier timber, more uniformly dense, stronger, and fitter for service, than if the trees had been cut down in their healthy state. Something of this nature was observed by Vitruvius and Evelyn. The ancients wrote their books on bark, especially on the bark of ash and lime-tree, not on the exterior, but on the inner and finer bark called philyra, and this custom is yet frequent in the East. Many kinds of bark are used in the arts. Some in agriculture and tanning leather, as the oak bark; some in physic, as the Jesuit's, &c.; others in dyeing, as the bark of alder and walnut trees; others in spicery, as cinnamon, mace, cassia, lignea, &c.; and others for divers uses, as the bark of the cork tree, &c. In the East Indies they prepare the bark of a certain tree, so as to spin it like hemp. After it has been beaten and steeped in water, they extract long threads from it, which are something between silk and common thread; being neither so soft nor so glossy as silk, nor so hard and rough as hemp. They mix silk with it in some stuffs, and these are called millaes and cherque-millaes.

The Japanese make paper of the bark of a species of mulberry tree. In the island of Otaheite, the natives make their cloth, which is of three kinds, of the barks of different trees, the paper mulberry above mentioned, the bread fruit tree, and the cocoa tree. That made of the mulberry is the finest and whitest, and worn chiefly by the principal people. Of the bark, too, of a tree which they call puerou, the hibiscus filiaceous of Linnæus, they manufacture excellent matting, a coarse sort which serves them to sleep upon, and a finer to wear in wet weather. Of the same bark they also make ropes and lines, from the thickness of an inch, to the size of a small packthread.

ON THE CONSTRUCTION OF A BARK-BED.

A BARK-BED, in *gardening*, is that sort of hot-bed which is wholly or principally constituted of tanners' bark, commonly employed in a hot-house, because it retains its heat longer, and emits less steam than a hot-bed of horse-dung.

This bed, from its preserving the most uniform and regular degrees of heat, is proved to be the most useful in the propagation and culture of all kinds of tender exotic plants, that are brought from warm climates, and which stand in need of the continued assistance of artificial heat, in this part of the world. Beds of this nature, with a little trouble in the management of them, are sometimes found to support a pretty uniform and regular temperature for a considerable length of time. They are generally employed in hot-houses, being formed in pits and cavities constructed for the purpose, frequently the whole length of the house, six or seven feet in width, and three in depth, being enclosed by means of brick-work.

In these beds the pots of tender exotics are plunged and supported, while they at the same time afford the houses or stoves degrees of heat that may be proper for the growth and support of other plants that do not require to be plunged into the beds.

Bark hot-beds are likewise occasionally formed in pits, constructed for them on the open ground, separately and detached from the hot-house. These are walled round with bricks, chiefly above the surface of the ground, having a frame or coping of wood upon the top, on which glass lights are fixed, so as to slide with facility.

Beds formed of bark are also employed with success in various sorts of early productions, as early strawberries, melons, peas, French beans, &c.: and by the regular and moderate heat they afford, they generally bring them forward in the greatest perfection. They are likewise made use of in forcing different sorts of curious flowers, of the bulbous, tuberous, and fibrous-rooted kinds, into early bloom—as hyacinths, dwarf-tulips, narcissus, jonquils, anemonies, ranunculuses, pinks, &c.; also many flowering plants of the same small shrubby kind, as roses, hypericums, &c. Bark beds are also employed with great advantage, in forcing-frames, for the purpose of producing early fruit of the apricot, peach, and grape kinds.

Hot-beds constituted of bark, from the slow and regular manner in which the heat is in common evolved, are not so liable as those formed of dung, to injure the plants by their steam; they are therefore to be preferred for all the more important purposes of forcing, where the material can be obtained.

The heat of them may be perpetuated for a great length of time, by having recourse occasionally to the practice of forking or turning them over, adding in such operations about a third part of tan or new bark. The beds must however be almost entirely renewed every autumn and spring.

ON THE CONSTRUCTION OF BARK PITS.

BARK pits are necessary for various purposes, in all hot-houses or stoves, and occasionally in forcing-houses, &c. Detached bark pits, distinct from the hot-house, are also very useful in all extensive gardens, on many occasions, being of great service in the culture of many sorts of tender exotics, and in raising various kinds under different methods of propagation, as well as for raising and nursing those of similar kinds in their young and tender growth; also for occasionally forcing and raising early productions of several sorts of hardy plants in the greatest perfection. Hot-houses, or stoves of the common width, have in general only one pit, extending lengthwise; but if they are of considerable extent in length, the pit is sometimes divided in the middle by an intervening passage, to render it more perfect in performing the necessary culture of the plants. Some hot-houses, however, of very great width, have two internal bark pits ranging parallel lengthwise, with an alley or passage extending between them, which renders them more commodious in giving the requisite culture to the plants that are plunged in the beds, than if the whole was in one extremely wide pit, in which it would often be very inconvenient to come at the plants placed towards the middle of them; so that two parallel pits, each four or five feet wide, become more eligible than one of eight or ten feet, and by having an intervening passage, give a larger scope, and afford a better current of air for the growth of the plants in the beds, as well as admit of reviewing them to greater advantage and effect.

Detached bark pits should be always erected in warm dry situations, in a southerly aspect, and ranged lengthwise, in the direction of east and west, or nearly so, in order to have the whole front incline fully to the same sun, in a sloping manner, on which to place the glasses in the same position, being generally stationed either contiguous to the hot-house or stove; or they may be erected at one or both ends, extending in a line with it, but separated by a passage between them.

Detached bark pits have sometimes ridged tops, like the roofs of houses, the glasses sloping to both sides, being ranged lengthwise north and south, in order to have the benefit of the sun, and used for the same purposes as the others, though the common south fronting pits, extending east and west, are more generally adopted, being less expensive in glass-work, &c., and in general, more convenient for different purposes of the forcing kind.

They should be constructed with walls of brick-work, forming the upright sides and ends nine inches thick; and where fire-flues are extended, the back wall should be of a proper thickness from the bottom, to admit of having flues in the upper parts, a fire-place being contrived externally at the bottom at one end, endwise or in the back part, as may be thought most convenient. Detached pits are formed of wood-work only, by means of posts and planking, serving for particular occasions, where no fire heat is required, as flues for that purpose cannot be admitted in such kinds of pits. If additional heat should be occasionally required, hot dung must be applied to the outsides. In these bark pits, young pine apples are sometimes nursed. They are also used for nursing tender plants in spring and summer, and for forcing early esculent crops, flowers, &c.

The principal detached bark pits should be formed with brick-work walls, as being both the most effectual for the purposes of heat, and the most durable.

Observations on the Dahlia, its Species and Varieties. By JOHN LEWIS RUSSELL, Professor of Botany and Vegetable Physiology to the Mass. Hort. Soc.*

THE surpassing beauty and brilliancy of the Dahlia has raised it, in the estimation of the floral taste, whether considered in its single unadorned simplicity, or when brought to the acme of perfection by the ingenious labours of the horticulturist. Scarcely unrivalled by the unique elegance of the camellia, it has become, like that remarkably transmuted plant, as universal a favourite among the curious and wealthy; and still more a companion of the antique and venerable accompaniments of the cottage garden or the village flower-bed, of some humble admirer of nature's sportive wonders, such as may be found in every community, and not by any means few in our own, happy, smiling New England. Perhaps the moral and mental improvement of a people cannot be better estimated, surely not better promoted, than in the observation and introduction of the spirit of the love of the more elegant and refined occupations attendant on agricultural pursuits. For my own part, I want no better proof of a feeling and exquisitely sensible mind, even under a rough and rude exterior, than may be observed in a love of nature, particularly that which relates to the care of flowers. A rose-bush, a honeysuckle, a pæony—famed in village love for pharmaceutic worth—a lilac-bush, or even a huge tuft of the singularly striped "ribbon grass," preserved by some rustic enclosure from the trespass of those sober, useful, though less intelligent, tenants of the farm-yard, whose tastes are more alimentary than mental—all denote a higher order of mind, in some tidy housewife, or younger female; and when I discover the highly patronized dahlia, lifting its rich blossoms among the associates of its new and strange locality, to me it proves the gradual development of a purity of taste and feeling, which, though not incongruous, is not always to be expected in such scenes. From the elevated sandy meadows of Mexico, where, scarce half a century since, they were probably first known, and shortly after, were transferred from the Mexican Botanic Garden, the species, and almost innumerable varieties have extended with a greater rapidity and more accompanied admiration over the civilized world, than perhaps any other vegetable. The rich alluvial soils of the south, and the hard rocky lands of the north, are adorned with their cultivation; and with a singular accommodation to circumstances, they evince scarce a preference in the expansion of their blossoms, for one section than for another. It is presumable, however, that heat is injurious to the perfection of their flowers—a defect which might be obviated in a great degree by application of more moisture. Naturalization or acclimation cannot speedily, if at all, be expected in our northern latitudes, unless occasionally accidental escape from the effects of frost be deemed such, which has been known in this vicinity in several instances; and a case was mentioned of a root exposed to the winters of several years, protected entirely by the early and deep snows so common in the mountainous regions of New Hampshire. In the Azores, they are lifted out of the soil at the approach of the winter season, and left exposed on the surface till the returning spring, undoubtedly with the view to give a temporary repose, and secure a greater amount of flowers.

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* From the American Gardener's Magazine.

So much has been said and written on the subject of my present remarks, that I can scarcely be expected to offer anything new; and it is only with the design of presenting your Magazine with a succinct account of the early history and rapid progress of this superb flower, together with whatever observations may suggest themselves, that I undertake the task. Mr. Joseph Sabine, in the third volume of the "Transactions of the Hort. Soc. in London," has drawn up a very able and exceedingly interesting article, embracing all that was known at that time (1818); but as it may not be easily available to many of your readers interested in the subject, I shall consider it a sufficient excuse to pursue my intentions.

"The dahlia," says Count Lelieur, "was originally from Mexico, and introduced into Europe 1789."—"From the Botanic Garden at Mexico, it was sent to that of Madrid, where it flowered for the first time in 1791." Cavanille (an ecclesiastic and eminent botanist) dedicated the genus to Dahl, a Swedish botanist, a disciple of Linnè, and the author of a work on his "Systema Vegetabillum." "In the same year (1791), he gave the description of three varieties sent from Mexico, which he considered as three *species*, constituting the genus Dáhl*ia*, viz., pinnàta, *r*òsea and coccinea" (*Memoire sur le Dahlia*, &c. pp. 3—4). In the number for March, 1835, of this Magazine (Vol. i, p. 114), some observations were made on the restoration of the old name of the genus, given by Cavanille, and altered from erroneous impressions of its being already appropriated, strengthened by a similarity of sound to Dàlea, belonging to an entirely different natural order and artificial class. Willdenow, in his *Species Plantarum*, applied that of Georg*ína*, after Georgi, an eminent Russian botanist, and De Candolle adopted it, apparently on such authority. With a similar desire of imitation, or the universal mania after new names, the florists of this country were fast falling into the supposed *improvement*, regardless of the untenableness of one averred objection, and the gross impropriety of violating that rule of every scientific nomenclature—that the original name should be sacredly preserved, to the exclusion of every other, unless founded on *good* and *substantial reasons* of real physiological difference. It was with unfeigned pleasure that I therefore hailed the restoration of Dáhl*ia*, and trust that the disciples of the illustrious star of northern Europe shall confer honour, and shed some reflected glory on the plant, which was dedicated to his fame and memory.

In the third volume of the "Annales du Museum," we find a memoir on the Dáhl*ia*, by M. Thouin, accompanied by a coloured plate of three varieties, viz., *r*òsea, purpùrea and coccínea, probably answering, at least in colour, to the three species of Cavanille—*r*òsea, pinnàta and coccínea. M. Thouin remarks that *r*òsea was of the size of *A*'ster chinénsis *L.*; and from the plate, it seems to resemble a prototype of "Queen of Naples," a somewhat old variety. One of these varieties is figured with semidouble flowers—a fact not a little remarkable, as this plate was issued in 1804, and Count Lelieur mentions, that not until 1817 could he obtain even two or three double varieties; about the same time, indeed, that the Dutch florists began to procure theirs from seed. A similar curious fact was observed in the difference of seed raised at Anteuil and St. Cloud, the richer soil producing only pure and simple flowers, whereas the thinner and lighter soils of the former place was only prone to produce the seeds of double varieties—accounted for on the philosophical principle, that it was a greater effort to produce a perfect seed than an imperfect one; that is, one capable of continuing an accidental and physiologically considered monstrous development of petals instead of stamens.

After several attempts to reduce to species the different varieties of this flower, each botanist and cultivator, adopting some trifling character, founded on the form of the leaves, or colour of the flower, De Candolle discovered that the essential distinctions consisted in the absence or presence of fertile florets in the ray, and termed, in the second edition of *Hortus Kewensis*, *supérflua* and *frustrànea*. Mr. Sabine reduces under the two following species of De Candolle the several synonyms, as quoted from the Hortus Kewensis:—

1. Dáhl*ia supérflua*, caule non pruinoso, flosculis radii fœmineis.
2. Dáhl*ia frustrànea*, caule pruinoso, flosculis radii neutris.

(*Hort. Kew.*, ed. 2, Vol. v, pp. 87, 88.)

By this arrangement it will be perceived that two species are formed, the first with "smooth stem, and fertile florets in the ray;" and the second with a pubescent or "hoary stem, and barren florets in the ray."

How far this arrangement has been observed, I have little means of determining. Loudon, in his *Hortus Britannicus*, gives a catalogue of sixty varieties of *D. supérflua*, and only five of *frustrànea*. But even with the characteristic differences which Sabine lays down, as to the coarseness of foliage and diffuseness of habit in *supérflua*, and the delicacy, compactness and erect manner of growth in *frustrànea*, I very much doubt whether in this country it would be easy to detect the species in the astonishing varieties of our gardens. It is almost certain that colour would afford no test, although the original colour was referable to purple in the former, and that of orange or scarlet in the latter. Still more uncertain the downiness or pubescence of the stems, which, though more or less observable in all, does not seem to constitute a permanent character. A series of experiments should be instituted, in order to endeavour to trace any observance of this specific difference of De Candolle, in the seedlings of our double varieties; and also whether, in this instance, unobserved, a real hybridizing process has not taken place between the two supposed genuine species.

It may be deemed presumptuous to seemingly question the authority of such celebrated names; but it must appear an important, and surely therefore a harmless inquiry, especially when we consider the tendency to confusion in such a myriad host of abnormal individuals, as our catalogues of the varieties of dahlias present. I trust, therefore, to the candour of discriminating minds, that nothing but a deep interest in the cause of scientific truth could for a moment prompt such an inquiry. Such a theory has been conceived before, from the failure of the Genevan botanists' characters, as also from other circumstances, which render it a still more interesting query; and at no better time could it be settled, unless it has already been done, than now, in the height of the universal popularity and general admiration which the subject of it obtains, as an ornament of our gardens and parterres.

It is a curious subject for reflection on the changes effected in horticulture, to be able to trace the opinions of learned men, founded in sound reason and observation, taking, for a moment, the situation they occupied, and casting a glance forward to our own experience and knowledge, which confirms or disproves their theories. Thus, De Candolle foretold the improbability of the occurrence of a blue variety, and we have almost every combined shade and primitive colour of the prismatic bow, excepting that Mr. Sabine tells us of the existence of a double white, which he feels inclined to doubt; and now "Kings" and "Queens," there are of double white, and even "Mountains of snow," and beauties of antiquity, unrivalled only by the elegance or purity of these fragile flowers; the grandeur of an avalanche exhibited in a petal, and the winning loveliness of female character shining forth in an abortive stamen.

But, with all the attractions of great and good and illustrious names, and the wondrous transmutations of floral skill—for wondrous they truly are—the simple, unadorned elegance of a fine single flower, with its eight perfectly formed petals and golden centre, expanding gradually into the florets of the disk, presents to my ideas a lovely work of nature's skill. Surely it is a mistake to exclude from our collections these primitive forms, to give place to double varieties only; and during the last season, one such has actually insinuated itself, of however only tolerable merit, more it may be suspected from its royal title or foreign origin, than from any returning taste to floral simplicity.

The dahlia, like many other cultivated plants, seems very prone to sportiveness or variation in the tints and pencillings of its petals. Cultivators begin to recommend the use of strong and nutritive manures in producing very fine flowers, an opinion entirely counter to one formerly entertained and practised upon—that of planting in poor and meagre soils. Undoubtedly the former practice is the better one, and added to this, the fact, that but a moderate degree of sun and heat is necessary to their increase, there can be no reason why the multiplication of flowers is not almost wholly at the disposal of the grower. The natural localities have been discovered to consist of sandy mountainous meadows, of 48 to 5400 feet above the level of the sea. A sandy meadow, in such a situation, may not be a poor or meagre soil; on the contrary, it is most probably a very rich one, being composed of the alluvial deposit of the decomposition, both mineral and vegetable, of the upper regions. It is certain that the effect of poor soil on the plant is to weaken the tendency to produce rich flowers, by the poverty of its entire growth, and that, when liberally supplied with suitable food and sufficient moisture, nothing can surpass the exuberance of its blooms.

The value of the dahlia seems confined to its intrinsic beauty and hardiness, as an ornamental plant. Many futile attempts have been made to introduce it among the esculent roots; but it would require a savage appetite, or a love for novelty, to bring this about. Its tubes, nevertheless, abound in farina, but the supposed presence of benzoic acid destroys their palatableness. The Compósitæ, in their general characters, though of great importance to mankind in their medical properties, offer few articles of nutritious food. The tubes of the tuberous sunflower, improperly and commonly called "Jerusalem artichoke," are indeed considered by some as delicate food, and the disk of the genuine artichoke is used in some countries extensively as an accompaniment to the table.

Every season brings to the dahlia some new insect foe, which attacks its valuable and tender buds, or devastates its foliage. The grasshopper (a common green species) and the *Syrtis erosa*, with *Membrasis bubalus*, better known to the unscientific as a two-horned triangular *bug*, has been peculiarly busy for a few seasons past. While some unknown pest, of a green and smooth larva, luxuriously riots on the rich petals, or undermines the leaves. A small dipterous (?) insect was also observed for the first time this year, but I was unable to detect any such new depredator. Nothing but a careful examination and diligent use of the fingers in seizing and crushing the intruders, with perhaps some liquid application to the roots, which should promote a more speedy and vigorous growth, is a preventive. It is to be hoped attention will be paid to this view of the subject, that some method may fortunately be devised to save from disappointment the promised glories of our finest and rarest plants, or at least that these insidious mischief-workers may be known and exposed.

I conclude this article with only one question to the experimental florist, viz., whether sufficient experiment has been made, as to soil or exposure, to insure the perfection of bloom in that rich and superb variety "Levick's Incomparable?" Every one who attended the last annual exhibition of the Massachusetts Horticultural Society, must remember a remarkable specimen, which graced the magnificent display of its sister varieties, and which was produced in the immediate vicinity.

Salem, Jan. 1836.

ON THE CULTIVATION AND MANAGEMENT OF PEACH TREES IN POTS.

The cultivation of peach trees in pots, has, with English amateurs and gardeners, been practised for many years, and considerable quantities of fruit are thus annually obtained. Knight, Nicol and others have published the results of their experiments, from the success of which we may infer that, though not a profitable way of furnishing the table with fine fruit, it is, nevertheless, an agreeable and interesting one. Some gardeners produce all their peaches in this manner, year after year, and treat the plants in the same manner as lemon and orange trees.

In this country, where the peach tree springs up from the seed, and produces its fruit without any care or labour, especially in the Middle and Southern states, it may be thought useless to bestow so much attention on it as would naturally be required, when grown in pots or boxes. It may seem to many as devoting time and labour to a useless purpose; and that horticultural zeal or enthusiasm only would ever carry one so far as to cultivate a tree in a pot, to produce its few dozen of fruit, when, from one growing in the open garden, bushels could be procured. This might be truly said to be the case, if no other object was gained. In large gardens, trees may be planted which will produce plenty of fruit, in the usual season; but, in very small ones, there is not often room enough to plant a single tree: to the former the cultivation of trees in pots will be valuable, as, with the assistance of a green-house, fruit may be picked a month or six weeks earlier; and, to the latter they are equally valuable, as fruit can be obtained, from a few pots of plants, sufficient to supply the wants of a small family. In our climate, the peach tree is now very little cultivated; from the effects of our long cold winters, from diseases, insects, soil, and other causes, it has been sadly neglected, and if the same inattention is continued, it will not be many years before there will be scarcely a tree found in our gardens. We are sorry to see this state of things, as we believe that the peach, with a little *proper* care, will flourish much better in our gardens than many suppose. Diseases and insects are allowed to increase *ad infinitum*, and the death or unhealthy state of every tree is laid to the severe climate. But as we are not writing upon the culture of the peach tree as a standard, in the garden or orchard, we return to our subject.

The value of peach trees in pots is exceedingly great to those persons who possess stoves and greenhouses; as a succession of fruit may be produced the year round. The habit of a tree, by proper care, may be wholly changed, so that it will put forth its leaves and blossoms at the same time that trees naturally produce their fruit. Thus, with a few trees, this desirable object may be obtained. In gardens where there are greenhouses alone, fruit may be picked from four to six weeks earlier than from the garden; and even without a pit or greenhouse, but only a warm dry cellar, the fruit may be forwarded fifteen or twenty days, and with the certainty of a crop. The plants can be placed in a warm situation during the warm days of March and April, and, if any danger is apprehended from frost, they can easily be removed to a sheltered situation. We have had considerable success in cultivating a few plants, and the results of our observations we now offer to our readers, with the hope that it may assist those who are desirous of procuring this delicious fruit every season, in growing and managing their plants.

There are various methods of procuring the plants—many preferring one year old from the bud, others two, and some three; for ourselves, we do not approve of either, unless there is need of great haste, in order to fill up the spare room in a new greenhouse or grapery. We know it is the general custom to procure budded dwarf plants from a nursery; but this we do not approve of, except in certain cases. As, however, some persons may purchase such, we offer a few remarks on their management—afterwards detailing our method, as taken from our memoranda.

When trees are selected from the nursery for pots, choose those which have been budded as near the soil as possible, and which are either upon their own or almond stocks, and one year old. The branches should be tolerably numerous, and spring out at regular distances on the stem. Be careful and select such as are free from *borers*, gum, canker, &c. They should also be taken up carefully, preserving all the smaller roots. When they are to be potted, cut off the largest woody roots, and coil the middling sized ones round the pot; fill in the compost, and spread out the small fibres as regularly as possible. Give the pot two or three hard knocks, to settle the soil. The branches should then be cut in to within four or five inches of the stem, being careful to perform the operation at a prominent wood-bud: after this the plants may be set in a warm situation, and watered as often as required; they will soon commence growing, and will make strong shoots and flower-buds the first season. The succeeding management is the same as will be detailed below.

The method we have adopted, and which we believe to possess many advantages over others, though requiring a little longer period to bring to maturity, is, to raise the plants from the seed. Peach stones can be procured almost anywhere, and it is immaterial how poor the kinds from which the plants are raised; they are merely wanted for stocks. Let them be collected together in the fall of the year, and laid away for planting in the month of November. At that time they should be sown in a bed in rows, about three or four inches apart, and covered an inch or more in depth. No other care is requisite through the winter: and in the month of May the plants will make their appearance above the soil. About the first of June, when they will be two or three inches high, with eight or ten leaves, preparations should be made to pot as many as there are trees wanted, allowing an overplus, as some may not grow very well, and, perhaps, a few of the buds will not take. For this purpose, have ready a quantity of sandy loam and leaf mould, in about equal parts, for a compost, and the pots, of the fourth size (seven inches wide by seven deep). Place some potsherds over the hole at the bottom, and partly fill the pot with the prepared soil; then take up the plant carefully, and transfer it to the pot, filling up round it with the compost, giving the pot two or three gentle taps, to settle the soil well, and finish with a good watering through a fine rose water-pot. The plants should then be placed in a warm shady situation for a week or two, until well rooted, when they may be removed into a sunny aspect, and the pots plunged up to the rims in the soil. Throughout the summer they should occasionally receive supplies of liquid manure, and the pots kept free from weeds. When only five or six plants are wanted, they may generally be found in the garden, where they often spring up from seeds, which are carried in with the manure. They should be potted in the same manner as above recommended.

By the middle of the month of August they will, if properly treated, have gained the height of twenty inches or more, with shoots as large as a pipe-stem, and of sufficient size for budding. The lower leaves should be stripped off to the height of eight or ten inches, a few days before inoculation. Buds should then be procured, of the best kinds, suitable for pot culture, and immediately inserted, choosing a dull cloudy day for the operation, and performing it very skilfully, as the stocks are so small that the buds will not unite quite as freely as on those two years old. Various sorts have been recommended as being the most prolific, and the following may be enumerated as preferable:—

Millett's Mignonne,
French Mignonne,
Violette hâtif,
Early Admirable,
Bellegarde,
Royal George.

Those that we have tried are as follows:—

Royal Kensington,
Belle de Vetry,
Teton de Venus,
Noblesse,
Bellegarde,
Alberge Royal,

All of which were selected from the nurseries of the vicinity. The Noblesse was not the true kind, and there are some doubts of one of the others. The Brunion nectarine, of which we budded one plant, produces fine crops in pots, and is a delicious kind. Particular pains should be taken to procure the sorts true to their names, and thus save much disappointment. After the buds are inserted, the plants may remain in the same situation, until severe frosts occur in the fall, when the pots should be taken up, to prevent their being broken, and placed in the cellar; if any roots run through the holes, they should be cut off. The plants will not need water more than two or three times through the winter.

In the spring of the year the plants should be taken out of the cellar, and, if convenient, put into a hot-bed or greenhouse, to give the buds a good start; head off the shoots three or four inches above the buds; when these have made a growth of a few inches, they should each be tied to small sticks, to prevent their being injured by the wind, or other accidents. Continue to supply the plant freely with water, and the buds will make a vigorous growth.

Preparations should now be made to repot the plants into the pots in which it is intended to fruit them. For this purpose they should be twelve or more inches wide at the top, and about the same in depth. Tubs and boxes answer very well, but they are not, in our opinion, so suitable as pots; they do not last long, and their appearance is not so neat. Having the pots in readiness, proceed to mix the compost, which should be composed of rich loam, leaf mould, sand, and old mortar or brick rubbish, in about the following proportions:—one third loam, one third leaf mould, one sixth sand, and one sixth lime or brick rubbish. Let these be thoroughly incorporated together, if convenient, about a week or a fortnight before wanted for use. When all is in readiness, shift the plants into the large pots; turn them out of those they were budded in, and, placing them in the large size, fill up round the balls of earth and roots with the compost, giving the pot several hard knocks, to settle it well; finish with a good watering, and place the plants in a half shady situation for a few days, at the end of which period they may be removed to the warmest part of the garden, and if there is plenty of room, the pots may be plunged in the ground, which will save considerable labour. Liquid manure should be applied, at least once a week, and its effect upon the plants will be quickly perceived. They will soon make a vigorous growth, and, in the course of a few weeks, if the main stem does not branch out of itself, it should be pinched off, so as to make it throw out laterals; a sufficient number of these should be retained to form a handsome head, and the remainder rubbed off. Throughout the summer they will require no other attention than watering and occasional inspection of the plants, to see that they are in a healthy condition.

Upon the approach of severe weather, the pots should be removed to the cellar, as in the first season. It is immaterial, at this age of the plants, whether the frost penetrates or not, provided it is free from dampness; they will not, in such a situation, need any care until spring; and if the soil is dry, it may be allowed to freeze hard the winter through, and the pots will not be broken, nor any injury done to the trees. Whenever it is wished to excite the buds in the spring, the pots must be removed to a proper place, which may be in the greenhouse, grapery, or pit, or, in the want of either of these, a warm room. Give the soil in the pots a good watering when they are taken from the cellar.

The management of these differs in different situations, and according to the earliness of the season in which they are excited into a growing state. Thus, in stoves in the months of January or February, it would be rather difficult to set the fruit, and a considerable knowledge of forcing would be required, to ensure the certainty of a crop; but later in the season, in March or April, when the object is only to assist nature in her operations, rather than to force her, no more care is necessary to ensure an abundant supply of fruit, than is given to the ordinary plants of the garden. Indeed, if water is duly supplied, the trees set in an airy place and properly pruned, we do not know that there is any obstacle in the way of the cultivator. We shall, therefore, at this time, confine our remarks to their treatment, which is very simple, when the latter object is in view.

Pruning.—In pruning trees in pots some care is requisite: cut out all the superfluous branches, in the centre of the tree, and also head off all the very strong shoots—as the finest fruits are produced on the middling sized branches. Always prune with an eye to the succeeding year's wood and crop, and not let the trees run up tall and straggling, and thus occupy much room; but rather keep them dwarfed as much as possible, and never obtain a greater height than five feet, with a good shaped head. Peach trees always produce their fruit on the previous year's wood, and if the gardener bears this in mind, he will never allow any old useless wood on the trees, but will always have them present a green and vigorous appearance.

Watering.—Give supplies of water every day when the pots are placed under cover, or not plunged in the ground; twice a week, after the fruit is *set*, liquid manure should be applied, and if the surface of the soil is covered with an inch or two of coarse manure, it will serve to prevent evaporation and strengthen the plants. The trees should also be syringed, when under cover, two or three times a week, and if in the open air, at least once a week, throughout the season.

Air.—In the first stage of the putting forth of the blossoms, but little air should be admitted; but as soon as they show signs of opening, it should then be given in large quantities. Syringing should also be omitted until the fruit is set. By this time the season will be so far advanced, that if they are in a greenhouse or grapery the air that is usually given to the other plants will be sufficient for the peach trees.

Fruiting.—When the fruit begins to colour, the watering should be partially withheld; and when it assumes nearly a ripe state, still less quantities must be applied. By this means, the cultivator has it in his power to give the fruit a fine flavour, which those grown in the ordinary method seldom or never acquire. We never tasted finer specimens of peaches than those we have raised in pots. The heavy rains which frequently fall in our climate in the month of September, often render a large part of those produced on trees in the garden very inferior in flavour.

Insects.—The insects which do the most injury to the peach tree are the *borer* (Ægeria exitiosa, *Say*), the *curculio* (C. nenuphar, *Herbot*), and the *aphides* (A'phis ròsæ *L.*) The first is the most destructive, not only to the peach-tree, but also to the plum, the apple, &c. The eggs of this insect are laid on the bark, at the base of the stem, and, as soon as the grub hatches, it eats its way under it, and continues to bore down and around the stem until it has, in fact, girdled the tree, thus causing its death. The first sign that they infest a tree is the appearance of gum, at the surface of the soil in the pots, immediately around the stem. As soon as this is perceived, they should be cut out with a sharp-pointed penknife; and if they have penetrated far down, a small wire should be run in to destroy the insect. The trees should be often looked over, in order to keep them free from their depredations—as we do not know of any certain preventive. The *curculio*, which may be described as a small beetle of the *coleoptera* tribe, is extremely troublesome in some districts, and whole crops are destroyed. The only preventive is, to destroy the insect in its larvæ state, by having every fruit picked up as soon as it falls from the tree, and given to the hogs, or otherwise disposed of, in a manner which shall prevent the insect from passing into the chrysalis state. By giving strict attention to this, its ravages will soon be impeded, and plenty of fruit preserved. The *aphides*, or *aphis*, do not touch the fruit, but injure the tree very much, by stopping the growth of the young shoots and, consequently, prevent their forming flower buds; the trees also have a very disagreeable appearance. Several methods have been suggested to stop their increase; but, when the trees are large, it is almost impossible. On trees in pots, however, they can be more easily got rid of—by the frequent use of water, saturated with tobacco, in the proportion of half a pound of the latter to a gallon of the former: turn the water on the tobacco boiling hot, and when it is cold syringe the trees with it; if they are very thick upon the extremities of the young shoots, dip them into the mixture for a few minutes, and it will soon destroy them. By continued attention to syringing of the trees with pure water, as we have before recommended, they do not increase very fast, and are not very troublesome to trees in pots. If from neglect, however, they attack them, this remedy should be applied.

Diseases.—The peach tree is subject to some diseases, which generally arise from a bad soil, or from injudicious management. That of the most common occurrence is the gum or canker. Trees planted in cold, stiff, wet soils, may be often observed with half or the whole of the branches covered with gum, which oozes out from around the buds in most instances, but frequently from the wood between them. We have never been troubled with this disease in the short period which has elapsed since we have given attention to the cultivation of the peach in pots, which we attribute principally to the peculiar kind of soil, which, it will be remembered, was quite *sandy* and open; but it may appear where attention has not been paid to the soil, and where there has been mismanagement. The best method of putting a stop to its increase, if it once appears, is to repot the trees in a new soil, made rather more sandy than we have recommended; cut away some of the large roots, and also head in the branches quite short; give the trees plenty of air, and with due attention to water, &c. they will generally recover. It may be well here to observe, that the soil which we have used and which we have recommended, though seemingly too poor for trees in pots, contrary to the general rule, in which the compost is made doubly rich, is one peculiarly fitted for the peach tree, and one in which we have ever had an extremely vigorous growth of wood, and a good crop of fruit. With that important ingredient in horticulture, liquid manure, which can be withheld or applied *ad libitum*, the cultivator has it in his power to produce either a strong or a weak growth; the soil is entirely under his management; but if the soil was made rich at first, its exciting quality could not be easily taken away. *Mildew* often strikes peach trees in greenhouses, and we have seen them almost white with it: it has been supposed, by some scientific cultivators, to arise from the soil and situation, and we are inclined to the same opinion. Although we have not been troubled with it, nor do we believe it will ever make its appearance on trees in pots, we mention it as among the diseases peculiar to the peach. It is one gratifying fact, in favour of the culture of peaches in pots, that they are but little subject to diseases. The facility with which insects are destroyed is also a great inducement to their cultivation.

Though we have extended our remarks to a much greater length than we at first intended, we could not well have given our ideas in a much less space; considerable may yet be said on the management of the trees after the third year; but as this mostly relates to pruning, we trust the good judgment of every cultivator will, with our hints on this subject, gather sufficient information to guide him in his future practice. We hope our observations will have a tendency to extend the growth of this delicious fruit in pots. We have endeavoured to simplify their culture as much as possible, in the desire we have to see every gentleman place on his table a tree loaded with peaches, to be plucked fresh and ripe, from the tree.—*American Gardener's Magazine.*

ON THE FORCING OF THE STRAWBERRY.

The high estimation in which the *Fragària*, or strawberry (as its name imports, from the very apparent qualities it possesses as a superior table fruit) has been held for many years, render it needless, in this place, to bestow any encomiums on its recommendation; as a table fruit, it may be considered of the first order, and in the confectionary department it is used in various ways, as creams, jams and jellies. To these may be added, that it is of a very wholesome quality, and recommended by the faculty, in many cases of sickness, in their catalogue of pleasant remedies, in which it is said to dissolve the tartareous incrustations on the teeth, promote perspiration, and sweeten the breath.

Class and Order.—According to the Linnæan system, it belongs to the twelfth class, *Icosándria*, having many stamens or male parts attached to the calyx; and the order *Polygynia*, having more than ten stiles or stigmas.

Species.—The species are numerous and undetermined, and are found to be natives of Britain, France, North and South America, India, and other parts of the world.

The varieties are very numerous, and daily increasing, by crossing them by means of impregnation, by which many very fine varieties have been obtained.

PROPAGATING THE STRAWBERRY FOR FORCING.

Rooting the Plants.—The method mostly adopted, and which, we think, most recommendable, is, to plant out some stools purposely, either in the spring or fall, on a rich plot of ground, in a western aspect. They may be planted three feet apart, and the ground well worked between them by digging in the spring and summer. When the flower trusses or stems begin to show, they should be nipped off, between the finger and thumb, which will strengthen the plants, and cause them to send out runners early; when the runners begin to grow, they are to be laid out in a regular manner, that the young plants may have a free circulation of air, and receive the sun. As the principal object is to obtain early plants, they may be greatly facilitated, by laying the joints, as they protrude from the plant; and if a quantity of well-rotted manure is occasionally thrown over them, the better: water may also be applied, to aid their early rooting, which is one grand object, in order to forward the plants in a vigorous, healthy manner.

Potting the Plants.—When a portion of the plants are thus rooted, they are to be potted in the following manner: a quantity of pots may be procured of the following dimensions: six inches deep, and about the same in diameter on the top, which may be filled with compost before or after plunging.

Compost.—The compost that I can best recommend, is two-thirds of good sandy loam, and one-third of leaf mould and horse manure, of equal quantity; this should be procured three months before planting, and well mixed and incorporated together, with which the pots are to be filled, previous to planting.

Plunging the Pots.—A situation for plunging the pots should be chosen in a western aspect, where the sun does not have its full influence, but where a free circulation of air can be obtained in every direction. The spot of ground being selected, prepare it for plunging the pots, by laying out beds three or four feet wide, or in such a manner as to admit of four, six or eight rows of pots in the bed across: the length may be in proportion to the quantity required. The bed may be laid out by marking with a spade, by a line on each side, when the earth is to be taken out to the depth of the pots, that their rims may be even with the surface of the ground. The pots are then to be placed in a regular manner in the bed, and filled (if not done before plunging) with the prepared compost; and, in such case, the vacancies between them will require to be filled with the earth taken from the bed, which is the most economical method, if the compost is not plentiful: on the other hand, the filling of the whole, when the pots are plunged, is the most ready method; therefore the choice of the best method must depend on circumstances. The pots being filled, the whole of the bed is to be well watered, to settle the earth in the pots; and in the evening (which is the best time,) the plants are to be dibbled into the pots.

Planting the Strawberry.—The young plants are to be taken from the vines, and dressed in the usual way, by shortening the roots, and taking off the dead leaves.

The plants are to be inserted in the pots with a dibble, in the usual method of planting, one, two or three in a pot. The number to be inserted depends on the time and strength of the plants, the object being to fill the pot with roots and a good crown, before wintering the plants; therefore in early planting, one in the centre of the pot, is best for the strong growing varieties, and two plants in a pot of the smaller varieties. In late setting out, they may be put accordingly thick, as two plants of the larger varieties, and three of the smaller in a triangular manner. When they are thus planted, they will require a good watering every evening, until their roots begin to be well established, when they may have every attention, to render them vigorous plants; and in the month of October, if one or two waterings of manure water are applied, they will be greatly benefitted, in the process of forcing, by the soil in which they grow being of a richer quality.

Shading the plants is, by many, recommended, and in many cases, perhaps, very judiciously, although we must precaution the young forcer that it weakens the plants, and therefore should be as much as possible evaded.

Protecting the Plants in the Winter.—When the winter commences, the pots are to be taken from the beds, and protected in cold frames, pits, sheds, or the like, in such a manner that they will not be too severely frozen, which will not only break the pots, but also injure the plants.

OPERATION OF FORCING THE STRAWBERRY.

Before we proceed to detail the manner of forcing the strawberry, it will be proper to make a few cursory remarks on the subject. The strawberry, in all cases of forcing, requires to be placed near the glass, in its first stage particularly. The process, at the first commencement, requires a very moderate temperature. The plants, when in bloom, need much water; but care must be taken not to wet the flowers. Shading is also requisite to the plants, when in flower, from eleven to one o'clock of every sunny day. At the time of swelling and ripening the fruit, air and heat are also requisite, in order to forward and give it colour and flavour. In contradiction to the above remarks, if the strawberry is placed far from the glass, it will grow slender, and throw up but few trusses of flowers, and weak and puny. Rapid forcing at the first commencement, will produce the same effect; keeping the pots dry when the plants are in flower, retards and destroys the blossoms from setting their fruit; and wetting the blossoms, in the act of watering the plants, destroys the pollen, and blinds the flower. Lastly, if the sun is admitted to the flowers at mid-day, with its full power, they will be blinded by its influence in a confined state, and hence the necessity of shading.

Operation of Forcing.—The strawberry is forced either in frames, pits or houses. Frames are perhaps too troublesome to become generally in use for the purpose, and houses too expensive for their culture, with the exception of large establishments, where they are moved from one house to another, as from the cherry house to the pinery, &c. But the most economical, as well as the best adapted method that we are acquainted with, in the forcing of the strawberry, is forcing them in pits, and which can be easily converted into frame or house culture, by any intelligent person. The pits may be of any dimensions, from three to ten feet wide in the clear, and, for this purpose, it may be worked with flues, in the usual method of forcing-houses, or partly by bottom heat, from manure and tan, and partly by flues. The first method requires a flue to run round the front and ends of the pit. The staging must be erected under the glass, at the distance of about a foot or eighteen inches from it, on which the pots of strawberries are to be placed and forced.

But the system that we can best recommend, is to force the strawberry in a pit, with a flue in the front, and a quantity of leaves and manure worked in a moderate temperature of heat; on the top of this, about two feet thick of old tan may be added, into which the pots are to be plunged to the rims. Having the pit prepared, by putting in the manure, the tan is then to be laid on to within eighteen inches or two feet of the glass; the pots are to be plunged therein to the rim, when the heat becomes moderate, which requires great precaution, or the plants will run up in a slender manner. At the first commencement of forcing, the pit should have plenty of air during the day, and the temperature through the night may be kept from 35 deg. to 40 deg. fire heat, and through the day to 45 deg. or 50 deg. This heat may be gradually increased from 40 deg. to 45 deg. during the night, and 50 deg. to 60 deg. during the day, with plenty of air. The plants may be gradually watered, and every means used to bring them on in a strong healthy manner; when they begin to throw up their trusses of flower stems, plenty of water must be applied, and air, as much as possible, be admitted to the flowers as they open. The temperature may be at this time kept as near as possible to 50 deg. through the night, and 60 deg. through the day, with plenty of air. The plants will be benefitted, if, at this time, they are divested of some of their leaves, which will give strength to the blossoms. In the middle of the day the pit will require to be shaded, when the sun shines, from eleven to one o'clock: this is more essentially necessary to the strawberry than any fruit we are acquainted with: the sun shining powerfully, as before observed, on the blossoms, when in a confined heat, often blinds or destroys the female part of the flower, which is the cause of blindness or barrenness.

Swelling the Fruit.—When the fruit is perfected, and beginning to swell, the shading may then be omitted; and the plants will require to be well watered whenever the earth becomes the least dry.

The temperature of the pit may at this time be kept as near as possible from 50 deg. to 55 deg. fire heat, during the night, and from 60 deg. to 75 deg., with sun heat, and plenty of air, during the day.

Ripening the Fruit.—When the fruit is nearly swollen to its proper size, the watering may then be in a measure suspended; and the pots may be removed into the stove, pinery, or any warm situation, to forward its ripening, as the strawberry will bear almost any heat, when the fruit is properly set; but in all cases, the pots should be so placed as to obtain the full influence of the sun, in order to give flavour to the fruit; when it is fully ripe, some pots may be taken to table with it on, which has a very pretty effect, besides being a very nice dessert. When it is all gathered, the pots of plants may be set out to obtain a fall crop, or for a new intended plantation.

The strawberry requires to be potted every year from young plants, as the old stools do not force well.

ON THE CULTIVATION OF ASPARAGUS.

The cultivation of asparagus, although so general, is by no means as well understood as it should be. Like many other vegetables, which have for years been cultivated, and which almost every gardener thinks he already raises to perfection, and needs no further information in relation to their growth, it can still be wonderfully improved in its mode of cultivation. The immense quantity which is produced for the market, and its superiority to that of former years, is a convincing proof that its cultivation is now much better understood than heretofore; and it is to be hoped, that it will still continue to be grown of larger size and more excellent quality. In private gardens, in particular, some fine specimens have been produced within the last two or three years; and, with little more care and expense, the market gardener may as easily supply his customers with this estimable vegetable in equal perfection. It is more with a desire to see our markets better supplied with a superior article, that I am induced to send these remarks; and if it will be the means of doing this, even in a small degree, I shall feel well repaid for my trouble.

There are several kinds of asparagus, some of which have been lately introduced, and have not yet become very well known. That which I have grown, and which I have proved to be of most excellent quality, as well as of monstrous size, is called the giant asparagus. It is, as yet, but little known, and, consequently, not very extensively cultivated. But so superior is it to the old kind generally grown, and of which hundreds of plantations now exist, that it must take their place very soon. Some cultivators do not like to destroy fruitful beds because the kind is rather inferior; yet I have no doubt that they would be more amply repaid in the end, if they were to make new plantations, and, as soon as they came into bearing, to entirely destroy the old ones. Its large size and fine appearance, together with its tenderness and flavour, recommend it to the notice of every market gardener who is desirous of any emulation for his productions, and to every gentleman and amateur, who is ambitious of supplying his table with the most excellent kind.

There has been considerable written upon the culture of asparagus, and there are various opinions respecting the best methods of cultivation. But leaving the reader to choose which system he pleases, I proceed to detail the method I have adopted, and which I have found to be completely successful. It is difficult to persuade those who have, for years, continued to grow any kinds of plants to tolerable perfection, to adopt new modes, with the hope of improving upon the long-trodden path; but the desire, which is increasing among gardeners, to be theorists, as well as experimentalists, will, sooner or later, dispel this idea.

In the month of May, select a spot of ground sufficiently large to plant the number of roots intended; if the plantation is to be large, and intended for supplying the market, the ground should be ploughed to a good depth; if for a common kitchen garden, it should be trenched to the depth of sixteen or twenty inches. Make the surface of the bed level, after this operation is performed. Then proceed to mark out places to dig the trenches for the roots; they should be two and a half feet apart; stretch a line the whole length of the bed, and with a small pointed stick make a drill; draw the next two and a half from this, and so on, to the whole width. Then proceed to throw out the soil six inches each side of the drill, and ten deep, laying it up in ridges between each trench. After this is done, throw in about four inches of manure; level the same, and add about two inches of soil on the surface, scraped from the side of the trenches; level this also, and all is ready for planting.

There are different opinions respecting the age at which roots should be planted. Some gardeners prefer one year old roots, some two, and some even three; when it is desired to have beds ready for cutting as soon as possible, three year old roots are set out; but I am doubtful whether much, if any thing, is gained by this. For my own planting, I always prefer those two years of age, and rather than set out older ones, I would have those of only one year; the produce may not be so great at first, but in a few years it is much larger. Select such only as have good fibres, and a fine bold crown, throwing out all weak roots. In setting out, place them six inches apart, and lay out the fibres in regular order, and not jumble them together, as is too often done, to the great injury of the plants. Much of their future success I attribute to the care given in setting out. When all are planted, cover them with about an inch of soil, and the work is all finished. The plants, throughout the summer, must be kept clear of weeds, and occasionally hoed; and by these two operations, and the summer rains, the trenches will, by October, be filled up as level as the bed was before setting out the roots.

The practice adopted by most, if not all, growers of this vegetable is, to set out the plants in deep trenches, and cover them, at once, six or eight, and in some instances twelve inches deep. Nothing can be more injurious than this; for a great part of the roots, especially those that are small, seldom make shoots strong enough to force their way through this depth of soil, and they consequently perish; or, if they come up, they are weak and small, and never afterwards attain to any size. It is an old system, and, like that of growing celery, now generally exploded, it should be likewise. In the method I have adopted, the roots have but a slight covering of earth, when planted, and the young shoots come forward very fast; as they increase in vigour, little more is added, till, by the assistance of the heavy summer rains, which wash the soil from the ridges into the trenches, they are completely covered. Scarcely a root has ever failed to grow. Upon the approach of cold weather, and after the tops have been killed by frost, they should be cut down even with the ground, and carried off; the bed should then be covered with two or three inches of fine horse manure, which should remain on until spring, when it must be forked into the surface of the bed. In doing this, be careful not to injure the crowns of the roots. Just before the shoots make their appearance, give the bed a good raking, which will destroy the weeds that are starting to grow. It is a bad practice to plant asparagus beds with radishes, lettuces, peppergrass, &c., as they exhaust the goodness of the soil. The second year, a few of the strongest shoots may be cut; but very sparingly, as the roots will be all the better afterwards. Continue to pursue the same system of culture every year, and the roots will rapidly increase in vigour.

The soil that asparagus seems most to delight in, is a light, rich, and rather sandy one, neither too wet nor too dry; when the soil is shallow, the trenches must not be dug so deep as above recommended. The manure I made use of, was fresh from the hog-pen, and somewhat strawy; but I presume any good manure would answer equally as well. The asparagus is a marine plant, and a light dressing of marsh mud, in the fall or spring, seems to increase the growth of the plants. I would recommend it when it can be easily obtained. Beds prepared in this manner, and yearly attended to, will last for a long length of time, and the produce will be of superior quality.

The plants may be raised from seeds, which should be sown in May, in a rich, sandy soil, in rows twelve or fifteen inches apart, and scattered tolerably thick in the rows. Cover them an inch deep, and when the young plants are up, keep them clear of weeds, and give them frequent hoeings. Pursue the same culture during the summer of the second year, and in the spring of the third they will be ready for transplanting into beds. I have occasionally exhibited specimens from my bed, at the Massachusetts Horticultural Society's room.

Yours, &c.

S. Pond.

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ON THE MANAGEMENT OF PLANTS IN ROOMS.

Amidst the rigours of stern winter, how delightful it is to exhale the balmy odours of a few select plants; even the lovely blush of the expanded rose, when the whole face of nature is clad in a mantle of snow, might entice the most careless admirers of Flora to supply their parlours with these delightful harbingers of pleasure through the winter months. But in all the numbers of your valuable Magazine, I have never observed any hints on the management of greenhouse plants kept in rooms or parlours. In order to supply this deficiency, I have, in as brief a manner as possible, endeavoured to give a few remarks, which may not, perhaps, be unimportant. You are aware that it would require too much room to enter into a minute detail, and enumerate a great number of species and varieties, with the modes of propagation; I shall, therefore, confine my remarks to those kinds most generally grown in such situations.

In the first place, I shall treat on the proper soils, and the potting or shifting of the plants;—secondly, how to arrange the plants on the stages or in the windows;—thirdly, on the watering of the plants;—fourthly and lastly, how to destroy insects that may annoy them.

I shall now begin by considering the plants procured from a friend, or purchased from the nurseryman or seedsman, and take the first part of the subject, namely, soils and potting. I may here merely mention, that all the soft wooded kinds will do very well in a good rich loam with a quantity of vegetable mould or decayed tree leaves (I would strongly recommend that a quantity of vegetable mould be kept in store, as it will suit almost every variety of plant); the same may be said of myrtles, oranges, lemons, *Aúcuba* japónica, *V*erbèna tryphylla [*A*lòysia citriodòra], &c., but not quite so light; the most part of the shrubby, or hard wooded kinds, such as ericas or heaths, diosmas, &c., like a peat soil, with a good quantity of white sand well mixed; two or three inches of the surface of the soil from an old oak wood will answer the purpose very well. There are some persons that think there is a stated time for potting or shifting plants. This is an error. There never ought to be any particular time; it ought to depend a great deal on the state of health and growth. Some plants may require shifting twice or thrice a year; others but once; the best way to ascertain whether a plant should be shifted, is to turn it carefully out of the pot, and examine if the roots are matted about the sides and bottom of the ball; and if such is the case, the plants evidently require fresh potting. But it is not always necessary to put plants into pots or tubs larger than those they were taken from; if that were always done, they would soon get out of all bounds. The ball may, with propriety, be reduced, perhaps, to half or third its former bulk. In preparing pots, be sure to put a handful of potsherds, or bricks broken up small, in the bottom of each; then put as much soil as will raise the surface of the ball to within about an inch of the brim; then place the plant exactly in the centre, and with a small wedge-shaped stick, fill in the soil between the ball and the sides of the pot, being careful that no cavity is left; the soil should be filled to within half an inch of the brim of a middle sized pot; if a very large pot, an inch should be left for water; by no means heap the pot with soil, as is too often done, especially by the ladies. After the plants are potted, they should have a gentle watering, and be kept from the mid-day sun for two or three days.

Arranging the plants on the stages or in the windows.—When a table is allotted for the plants, let it be placed as near the window as possible; place the smallest ones next to the glass, and so on with the second and third sizes, finishing with the tallest back, so that they may all have an equal share of the sun and air;—by no means place them the reverse of the mode just mentioned. But some of your fair readers may observe, that the beauty of the plants will be hidden from their visiters, especially those who prefer show to the health of their plants. This inconvenience may be avoided by having small stages made to fit the windows, placing them on castors, that they may be turned so as to view the plants, or drawn back in a very hot sunshine. I should think there would be no lover of plants but would go to a trifling expense in order to have them look well. Observe to give air every day, except in very severe frosts.

The watering of the plants.—The following question has been often put to me—How often should plants be watered? In answer to the question, I would observe, that there never ought to be any stated tine, but when they are in want of it; and that want they will generally make known themselves, by the drooping of their leaves; in hot weather, they should be looked over at least once, if not twice, a day; and at these times, only water those that are in want of it. I am of the belief, that one half of parlour plants are killed or sickened, either by withholding water, or making too frequent use of it; by the former, the plants will soon begin to lose their leaves, and by the latter, the soil will be kept saturated, and the roots become rotten, which must cause the death of the plants. There is another evil, practised by the ladies, which I will mention; that is, having the plants in saucers, and watering them at the roots; this is a practice that cannot be too strongly deprecated. The water ought always to be poured on the surface, so that the fibres may be all equally refreshed. I am aware that there are many persons who will not agree with me in deprecating the use of saucers, on account of the carpet and furniture; but let me observe that I have no objection to the use of saucers, provided they do not allow water to stand in them. Such plants, however, as the *Agapánthus* umbellàtus and *Cálla* æthiópica, &c., can never be injured, but, on the contrary, will be benefitted by standing in water; and, at times, let the plants be taken out of doors and sprinkled over head, which greatly refreshes them, and takes the dust from the leaves. If any of the *Cácteæ* tribe are kept through the winter, they should not be watered; but after they begin to show their flower buds, they should have a very liberal supply; on no account keep them always damp.

Destroying insects that annoy plants.—The chief enemy is the green fly, which can be easily destroyed by placing the plants in a close room and fumigating them with tobacco smoke. Let the room be well filled with smoke for about half an hour, and their death will be the result. Myrtles, oranges, &c., are infected with a brown scaly insect, which cannot be destroyed by tobacco smoke. They must be washed, leaf by leaf, with a piece of sponge, dipped in a mixture of soap and water, impregnated with a little tobacco. The whole should be well mixed, and used a little warm.

J. S.

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Notice of some of the Epiphytæ, and Parasitic Plants of the United States, with Remarks on their Physiological Characters.

By John Lewis Russell, Prof. Bot. etc., to the Mass. Hort. Soc.*

ALTHOUGH the tropics are peculiarly rich in these curious vegetables, which luxuriate in the dark and rapidly growing and decaying forests, yet even our more northern clime can furnish a few no less interesting to the lover of science, though far less attractive to the artificial taste of the florist. Several genera may be found in the New England States, which, independent of their parasitic character, are remarkable for the singularity of their form. In your summer ramble through the dense and damp woods, you may perchance meet with a curious cluster of brown, or yellowish, and extremely succulent, vegetables, covered with a pubescence, and instead of leaves, invested with minute scales. Should your curiosity prompt you to stoop and examine the anomalous and fungous-looking body, you will discover, gentle reader! the curious and beautiful native epiphytic *Orobánche*, whose minute examination may repay your attention. This genus forms the type of the natural order of *Orobánchesæ* of Jussieu and of Lindley, and under this same order is its cogenus *Epiphagus* of Nuttall; which being a parasite on the roots of the beech (*Fágus*) has received from him its beautifully appropriate name. One species, the "E. americanus," is said to be found in Maine, but not in this vicinity.

Perhaps not far distant, and in the same ramble, you will notice the remarkable, and ivory Monótropa, in which nature seems to have forgotten her usual livery of green to invest one of her fairy and delicate productions in a vesture of entire, unsullied purity. By a sort of desecration, it has received, in common language, the trivial name of that instrument which affords an exhilarating solace to many a devotee to the "fragrant weed." But however apt its resemblance or name, it may be a question whether the simple taste which dictates the admiration of the flower, would not have proved as beneficial to the general happiness, as that more luxurious taste which invented both the name and its origin. Another cogenus, and you have Hypópithys, of which "H. lanuginòsa" is by no means rare in the neighbourhood of Boston, and is a distinct parasite, affixing its densely crowded stems to the roots of trees.

And have you not often observed the golden and glittering thread-like branches of the twining *Cúscuta*, climbing with an aspiring habit, not unlike its more gigantic, though not parasitic sister vegetables, up the slender stem of some delicate grass or plant herb; by the rapidity of its growth, and predatory disposition, draining the very vital energy from its supporter, till over-climbing, and over-reaching, it still progresses onward, over the topmost foliage, and lays hold of whatever next presents itself, till all are involved in inextricable confusion; and then, as if in triumph at the mischief it has occasioned, cover its leafless, voluble stems, with a mass of clustered flowers?

The first growth of the *Cúscuta* exhibits an anomaly of a vascular plant with perfect seeds, germinating without any cotyledon. A few other plants arranged under the exogènæ on account of their organization, are, in common with this, in fact, acotyledonous. The absence of cotyledons has led to the theory of their presence in a consolidated, and consequently unfolded or undeveloped condition.

Throughout the Western States, you will find, particularly upon the branches of the elm, the sempervirent misletoe (*Viscum* verticillàtum), whose parasitic and epiphytic character, and supposed virtues, so early attracted notice. It is one of the few plants connected with the superstitions of a barbarous age, and from its rare occurrence on the oak, was estimated, when discovered in that situation, as peculiarly sacred. But like many other things that have nothing but antiquity to recommend them, its fictitious good qualities are overlooked, while its more prominent character of disfiguring the branches of its otherwise graceful and elegant supporter, are only noticeable.

Farther south, in Florida, and on the sea coast of Georgia and Carolina, we meet with a species of the true and genuine epiphyte, in the "Epidéndrum conópseum." This is the only representative in the United States, of that curious genus. It has been found growing on the trunks of the noble "Magnòlia grandiflora," both by Nuttall and Elliott, and by the latter, observed also on several species of oak.

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* From the American Gardener's Magazine.

In the last number of the American Gardener's Magazine, for April, it is incautiously stated, speaking of this plant, that it is "interesting as the only parasitical plant yet discovered in the United States." (p. 144, Vol. II.) It is true that it is the only epiphyte connected with the numerous congeners and co-species so common in other and tropical climates. That we have other parasitic epiphytes, has been already shown.

An almost innummerable family of less perfectly organized vegetable forms, which are to a certain extent parasitic, is composed of the Lichenes, Fungi, Hepaticæ, etc., but these deriving no necessary nutriment from the vegetables on which they are found, and growing also on the surface of rocks and of other bodies, are termed false parasites. None the less important are they, however, in the great economy of nature, which renders each minute particle of organized matter a great and necessary agent in her operations.

ON THE CULTURE OF SOME VARIETIES OF STRAWBERRIES.

A GOOD many persons having attempted the cultivation of the new large growing kinds of strawberries, with very various success, I will, agreeably to your request, state the results of my own experiments with some of them, and of which you have, I believe, seen specimens of the fruit, which have at different times been exhibited at the Horticultural Shows.

Knight's Seedling.—This variety, almost every one knows, was produced from seed, by the venerable Mr. Knight, President of the Horticultural Society.

The soil upon which my strawberry plat is situated, is constituted of a light mellow loam, resting upon a sandy sub-soil, somewhat sheltered from the north-west. In the latter part of August, suitable preparation having been made, old rotten manure, to the depth of three inches, was turned in to the full depth of the spade; and the beds lined out, so as to leave the rows *twenty* inches asunder, and the plants *fourteen* inches from each other in the rows, placed in the quincuncial order. Before the severe frosts set in, they were covered slightly with leaves, and a little old manure thrown on the top, to prevent their being blown away. Scarcely a plant suffered through the winter, and the first year, the stools consisting of single plants, the quantity of fruit was small; many of the berries were however quite large, and of the coxcomb shape. The next season, the stools had become well established; and in April the leaves and manure, with which they had been covered, were pointed in, and the beds dressed. When coming into bloom, and before the fruit had set, the spaces between the rows, and between the stools, were wholly covered with newly mowed grass, cut from the banks and the turf edges round the walks. This was used as a substitute for, and in preference to straw: it is more easily arranged about the stools; and it is readily obtained, as it is required about the period when you wish to crop the banks the first time. "Grass cut from lawns," is recommended in Loudon's Magazine for the same purpose; although it is not many years since, that Sir Joseph Banks advised a return to the old practice of the use of straw (from which this fruit has derived its name), as preferable to the many contrivances of trenches between the rows, boards laid lengthwise, and tiles, which had been substituted for the same object.

As it is possible that every person who may be about planting a strawberry bed, may not be aware of the uses of the grass, I will allude to them. In the first place, it protects the plants against drought, by shading their roots from the sun's rays, and also by resisting the escape of the moisture, which would otherwise evaporate into the atmosphere. Of all the large sorts, the *scapes*, or stems, are too feeble to support the fruit, when ripe, in an upright position, consequently, all that which grows on the outside of the stools falls into the soil, and is, *of course*, spoiled; heavy showers, too, beat up the soil over much of the fruit, and make it *gritty*. When the beds are dressed in the spring, it is desirable not to disturb them till the crop is gathered, and the grass serves to keep the weeds down. It is said also to prevent the attack of slugs, as they cannot pass over it.

This was properly the first bearing year, and nothing could look finer than the vines when in fruit: the crop was abundant; many of the berries were of the coxcomb form, and some of them assuming circular and fanciful shapes, with the *calyx* nearly invisible in the centre.

After the fruit season had passed, the grass was removed, and the vines were permitted to extend themselves, and such of the runners as had not been used, were dug in, before covering in the autumn, so as to keep the stools entirely distinct.

The next year, the stools having increased in size, the quantity of fruit was greater in proportion; the berries, however, were much more generally conical in shape. The third season, which was the last, the product was fully equal to the previous one.

The flavour of this variety being equal to the smaller sorts, and the flesh finer and more delicate than any of the larger ones, it is, on all accounts, entitled to a preference over any of the new varieties which I have cultivated.

It is important, however, with Knight's seedling, in making a bed, that the runners be all taken from fruitful plants, bearing as it does, its *staminate* and *pistillate* flowers on different roots: there is danger of obtaining some that are called *males*, which are entirely useless, and exhaust the soil to no purpose; and as they are not weakened by the production of fruit, the runners extend themselves much more rapidly than the others. It is not long since, that it was thought necessary, in planting, to apportion *one* sterile to about *ten* fruitful plants; but this opinion is exploded, and now all but the fruitful ones are carefully avoided; nor is it necessary to wait for the flower to determine them; the difference is perceptible in the foliage, that of the sterile being much more rank and coarse.

Wilmot's Superb.—This variety, which has excited so much admiration, is treated in the same mode as *Knight's Seedling* (I have, in fact, employed the same method with all the large sorts which I have attempted to cultivate), was abandoned, after the second year; the product being so small as not to warrant farther trial.

Keen's Seedling.—This has succeeded well; it is a good bearer, and of fine flavour; not quite equal to *Knight's Seedling*, in either point; but its large, dark, rich berries are altogether a beautiful fruit, and it well deserves cultivation.

The last season, an individual at East Cambridge produced an abundant crop, and larger fruit than I have ever before seen of this variety; whilst other persons, experienced cultivators too, have given up this, as well as the *Knight's Seedling*, after a trial, for want of success. In the cases of failure, there seems to have been one radical error; that is, the plants have been placed upon strong, rich garden soils, and often somewhat moist: whether such soils are too adhesive to permit the fibres sufficiently to extend themselves; or the nutriment which the plant absorbs, be unfit to form the basis of fruit, is a matter of mere theory, which is of no importance, so long as the facts which the results exhibit are before us, and which have been, as far as my own observations have extended to such situations, a profusion of foliage, but little or no fruit.

Methven Castle, or *Methven Scarlet.*—This strawberry, more hardy than any of the large kinds, is very prolific; but the fruit is somewhat spongy in the centre, and it has not the fine flavour of some other sorts; still the magnificent appearance of its enormously large globular berries, renders it a desirable object of cultivation to a certain extent. The question has often been agitated, as to the comparative merits of these new large varieties, with some of the older and smaller ones. With all the *smaller* fruits, size and appearance, certainly weigh a great deal in the estimate of their value; and almost every cultivator would be desirous of growing a proportion of the fine large sorts; and, with proper management, they would unquestionably well repay him; still it is not to be denied that they require to be treated with a *good deal more care and attention* than the small ones, to expect success. Of the latter kinds, I have made trial of several varieties, among which is the

Wood Strawberry.—This old variety has excellent properties: if well cultivated, a greater crop may be obtained from the same space, than of any other kind: the period of its ripening is of long duration: it may be cultivated with as little labour, and it will produce well for three successive years, on beds running into mats. With this, as with all other fruits, the red is of higher flavour than the white.

Alpine.—This old variety may be managed very similarly to the *Wood*: it has been sometimes recommended to cultivate it by seed, as a preferable mode to using the runners; but it is believed without much reason. I once attempted it with the *White Alpine without runners;* the seed, thought to be very choice, was received from the Horticultural Society of Paris. The plants were brought forward in a frame, and, at the proper period, they were transplanted: the stools enlarge themselves by offsets, and, like all this variety, it continued bearing till into autumn. Its extremely long and slender fruit had nothing peculiar in its flavour, nor did it seem to be worthy of cultivation, farther than as a matter of variety.

It is desirable, in a private garden, to make a new bed annually, which will enable the cultivator to turn in an old one at the same time, and still keep up a succession; as the strawberry is a great exhauster of the soil, the ground occupied by the old bed should be appropriated to some other crop.

Some distinguished cultivators have recommended burning the vines; in the spring, they put on a covering of dry straw, an inch in thickness, and set on fire different portions of the same bed at three different periods. It is said to lengthen out the succession of the crop, and that the product is much larger. I have had no experience in this practice.—*Amer. Gard. Mag.*

A FEW REMARKS ON THE TREATMENT OF CYCLAMENS.

THIS very beautiful bulb, though by no means a rare plant, is far, however, from being common, or at least, is very seldom seen in flower. I have a few plants, which, with no particular care, produce forty or fifty flowers each, every season; and if the following remarks will render its culture less difficult, they are willingly at your disposal.

The compost I have made use of for cyclamens is composed of nearly the following kinds of soils:—loam, dung, leaf mould, and sand—the latter in not quite so large proportion as the three former. After the bulbs have done blooming, or have made their growth, in the spring, they should be turned out into the border, in the garden, and planted in a warm, unshaded aspect, in a rich spot, if not naturally so—loam and leaf mould, with sand, should be added. Set them an inch or more under the surface of the soil.

During summer they should receive supplies of water, in dry weather, and the soil occasionally loosened round the bulbs. About the latter end of August or beginning of September, the plants should be taken up into pots. The proper size for good strong roots is number four; smaller ones may be put in the next size below. Use the compost recommended above, and take the plants up carefully, placing one in each pot; settle the compost well, by giving the pot one or two gentle taps, and set the plants away in a half shady place for a few days. Afterwards inure them to the sun, and when the other plants are removed to the greenhouse or parlour take these in also. During the winter keep them in an airy place, and give them moderate supplies of water. Toward spring they will begin to throw up their flower stems, when they must be supplied more liberally with this element; water every day in dry weather and the plants will grow rapidly and throw up from forty to fifty flower-buds; set them where they will receive plenty of air, to prevent their being drawn up, and they will make an elegant appearance.

When the flowers have all appeared, the bulb should again be turned into the border, as I have recommended; the same attention should be given, and the plants taken up in the fall: they will perhaps need a larger pot this year, which should be given them, if they do. Use the same compost as in the previous year, and treat in the same manner, and a handsome bloom will be the result. Seeds are sometimes obtained, and plants may be raised in this manner. I have sown some this year, and shall, at some future time, give you my method of treating them. These few remarks are intended to apply to old roots. T. C.

DESCRIPTION OF THE PLATES.

LILIUM BULBIFERUM.

ORANGE LILY.

Hexandria Monogynia.

Liliaceæ.

Gen. Char.—Sepals 6, campanulate, with a longitudinal honey-line, and generally reflexed; valves of the capsules connected by a mesh of hairs.

Spec. Char.—Leaves scattered; corolla campanulate, upright, rough inside.

Miller observes that, "The common orange or red Lily is as well known in the English gardens as the white Lily, and has been as long cultivated here. This grows naturally in Austria and some parts of Italy. It multiplies very fast by offsets from the roots, and is now so common as almost to be rejected: however, in large gardens these should not be wanting, for they make a good appearance when in flower, if they are properly disposed; of this sort there are the following varieties:—

"The orange Lily with double flowers; the orange Lily with variegated leaves; the smaller orange Lily.

"These varieties have been obtained by culture, and are preserved in the gardens of florists. They all flower in June and July, and their stalks decay in September, when the roots may be transplanted and their offsets taken off, which should be done once in two or three years, otherwise their branches will be too large, and the flower-stalks weak. This doth not put out new roots till towards spring, so that the roots may be transplanted any time after the stalks decay, till November. It will thrive in any soil or situation, but will be strongest in a soft gentle loam, not too moist."

Bears the smoke of London better than many plants. Varies with and without bulbs on the stalks.

LUPINUS PERENNIS.

PERENNIAL LUPINE.

Diadelphia Decandria.

Leguminosæ.

Gen. Char.—Calyx two-lipped; anthers 5 oblong, 5 round; legume coriaceous, torulose, compressed.

Spec. Char.—Calyx alternate, without appendage; upper lip emarginate; lower entire.

Its root is not only perennial, but creeping also. Mr. Miller informs us that he traced some of them belonging to plants of a year old, to the depth of three feet; they also spread out far and wide; hence the roots even of young plants are with difficulty taken up entire, and as they do not succeed well by transplanting, if the root be cut or broken, he prefers raising this elegant plant from seed, which, though not very plentifully produced, ripen in July and August: care must be taken to gather them as soon as ripe.

It is a native of Virginia, and appears to have been cultivated in the Botanic Garden at Oxford, as long since as 1658.

Flowers from May to July.

Is a hardy perennial, succeeding best in a dry situation, with a loam moderately stiff.

IXORA FLAMMEA.

SCARLET IXORA.
Tetrandria Monogynia.
Rubiaceæ.

Gen. Char.—Calyx four-parted; corolla monopetalous, funnel-shaped, long; stamens above the throat; berry four-seeded.

Spec. Char.—Leaves subsessile, oblong; corymbs dense; petals round, spreading; anthers round, bristle-pointed.

Both Rheede and Rumphius describe and figure this splendid plant in their respective works, the *Hortus Malabaricus* and *Herbarium Amboinese;* it is mentioned also by several other authors. From their various accounts we discover, that in different parts of India, where it grows wild, it forms a slender shrub, or tree, about six feet high, rising generally with a single stem; that its clusters of flowers, seen from afar, are so brilliant as to resemble a burning coal, especially in a dark wood, whence its name of *Flamma Sylvarum;* that it grows in the woods, and flowers in September and October, producing a black fruit, the size of small cherries, on which the peacocks are supposed to feed, and from whence they have obtained the name of *Cerasa Pavonina*. The Chinese call it *Santanhoa;* with them it produces flowers and fruit the year through, and they hold the blossoms in such veneration, as to use them in the sacrifices they make to their idol Ixora; whence Linnæus has taken the name applied by him to this genus. The root is said to possess some acrimony, and to be made use of by the natives in curing the toothach.

It is customary in this country, to treat the Ixora as a stove plant; perhaps it may be less tender than we are aware of; it flowers in July and August, but has not been known to produce fruit; is increased from cuttings, without much difficulty, in sand under a hand glass. Care must be taken to keep it clean, and free from insects, or it will not thrive.

ASTER ALPINUS.

ALPINE ASTER.
Syngenesia Polygamia Superflua.
Compositæ.

Gen. Char.—Receptacle naked; florets of the ray more than 10; pappus simple.

Spec. Char.—Stem one-flowered; leaves lanceolate, spatulate; cauline lanceolate; scales of involucrum nearly equal, lanceolate bluntish.

Clusius and Jacquin, by both of whom this species of Aster is figured and described, inform us, that it grows spontaneously on the Austrian Alps: of the many hardy herbaceous species cultivated in our gardens, this is by far the most humble in its growth; in its wild state acquiring the height of about four inches, and when cultivated, rarely exceeding eight or nine: its blossoms for its size are large and shewy, making their appearance much earlier than any of the others, viz. about the end of May and beginning of June, and continuing in blossom three weeks or a month.

It is readily propagated by parting its roots in the autumn; may be kept in pots, or planted in an open border; prefers a moist stiffish soil; if carefully watered in dry weather, will grow among rock-work, for which, from its size, it is well adapted.

SEDUM POPULIFOLIUM.

POPLAR-LEAVED STONECROP.
Decandria Pentagynia.
Crassulaceæ.

Gen. Char.—Calyx five-cleft; petals 5; five honey-scales at base of the ovary; capsules 5.

Spec. Char.—Leaves flat, cordate, toothed, stalked; corymbs terminal.

Professor Pallas, the celebrated Russian naturalist, discovered this species of Sedum in Siberia, and in the year 1780, introduced it to the royal garden at Kew; the younger Linnæus describes it minutely in his *Suppl. Plantarum*, and observes, that in its general form it much resembles the *Saxifraga rotundifolia.*

Its leaves are flat, as in many of the other species, and when the plant grows in an open situation, exposed to the sun, they become, as well as the stalks, of a bright red colour, which adds much to its beauty.

It is the only hardy Sedum cultivated in our gardens with a shrubby stalk; its leaves, however, are deciduous, so that in the winter it loses its verdure; it flowers in July and August, and is readily increased by cuttings.

As most of this tribe grow readily, and many of them naturally on rocks and walls, they may be in general regarded as proper rock plants; some of them, however, are apt, by the quickness of their growth, to extend over and destroy plants of more value; this fault, if such it may be deemed, is not imputable to the *populifolius.*

Some, not knowing its native place of growth, keep it in the greenhouse.

IXIA CHINENSIS.

CHINESE IXIA.
Triandria Monogynia.
Irideæ.

Gen. Char.—Spatha two-valved; flower with a slender tube and regular limb; stigmas 3, narrow, recurved; capsules globose, ovate.

Spec. Char.—Leaves ensiform; panicle dichotomous; flowers pedunculate.

The root of this plant is yellow and tuberous like that of the Iris; the leaves also greatly resemble those of that tribe; it grows to the height of about three feet, and produces a considerable number of flowers in succession, each of which is of short duration.

In that elaborate and inestimable work, the *Hortus Malabaricus*, we have a good figure of the plant here exhibited, accompanied by a minute description; the author informs us that it grows spontaneously in India, attaining even the height of five or six feet, and affecting a sandy soil; the natives consider it as an antidote to poisons in general, and regard the bruised root as peculiarly efficacious in curing the bite of the serpent called *Cobra de Copella.*

It is a tender, herbaceous plant, readily increased by dividing the roots and planting them in a mixture of loam and peat.

IBERIS GIBRALTARICA.

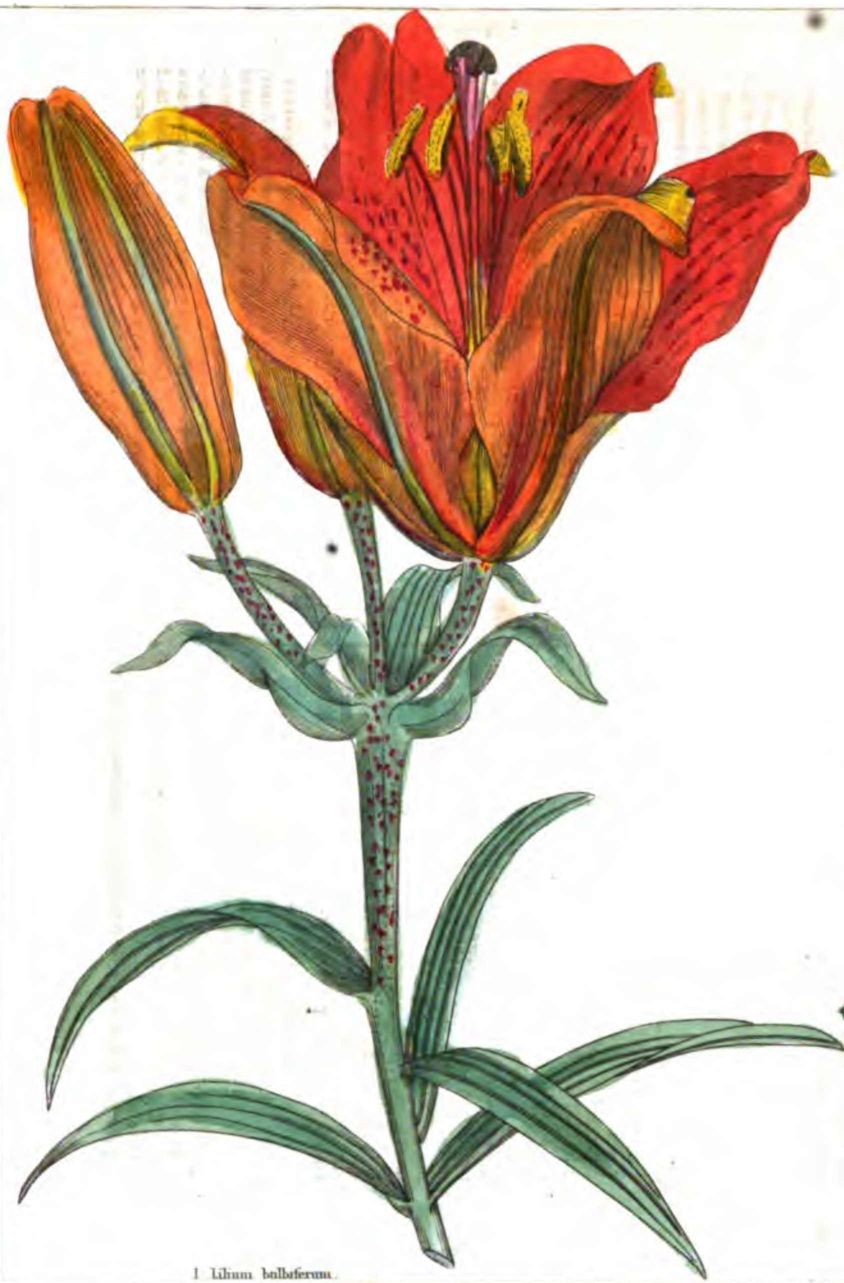
GIBRALTAR CANDY-TUFT.
Tetradynamia Siliculosa.
Cruciferæ.

Gen. Char.—The outer petals largest; silicle compressed, truncate, emarginate.

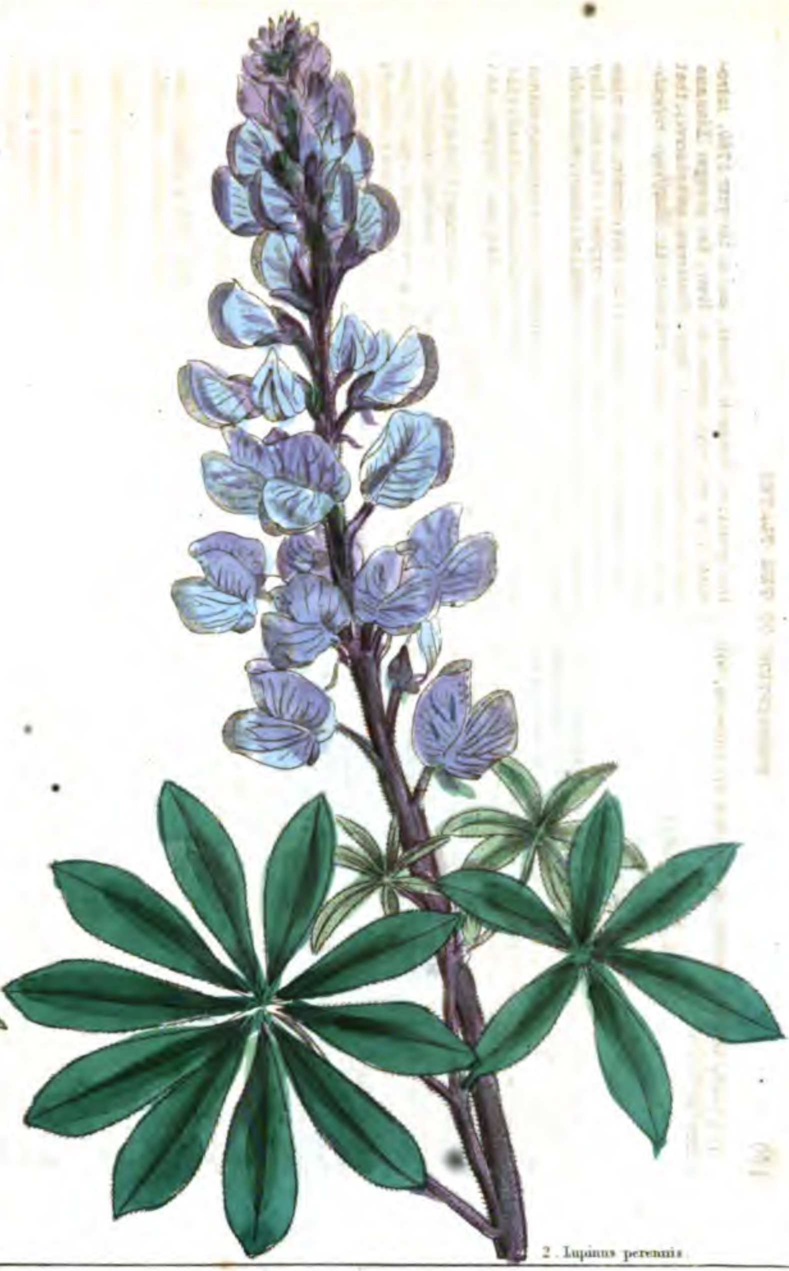
Spec. Char.—Leaves cuneiform, obtuse, somewhat toothed at end, a little ciliated; flowers corymbose.

The flowers of this plant, a native of Gibraltar, bear some resemblance to those of the Common Candy-Tuft, but when they blow in perfection, they are usually twice as large; hence they are highly ornamental in the greenhouse, which early in the spring, the time of their coming forth, stands in need of some such shewy flowers.

This plant is easily raised from cuttings, and easily preserved; it may be kept through the winter in a common hot-bed frame, and in mild winters will stand abroad, especially if sheltered amongst rock-work; its greatest enemy is moisture in the winter season; this often proves fatal to it, as indeed a long continued damp atmosphere does to many others; the nurserymen about London complain of losing more plants the last mild winter, from this cause, than they generally do from severe frosts.

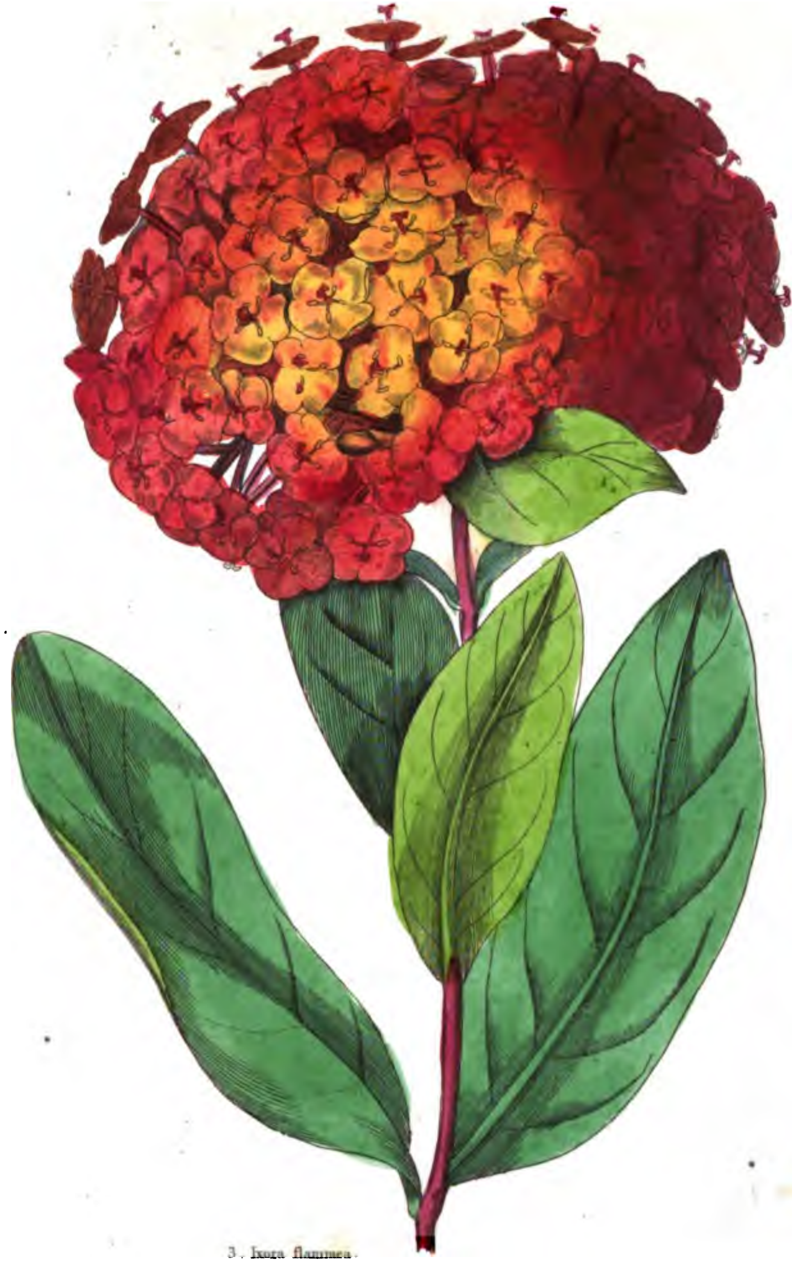


1 Lilium bulbiferum.

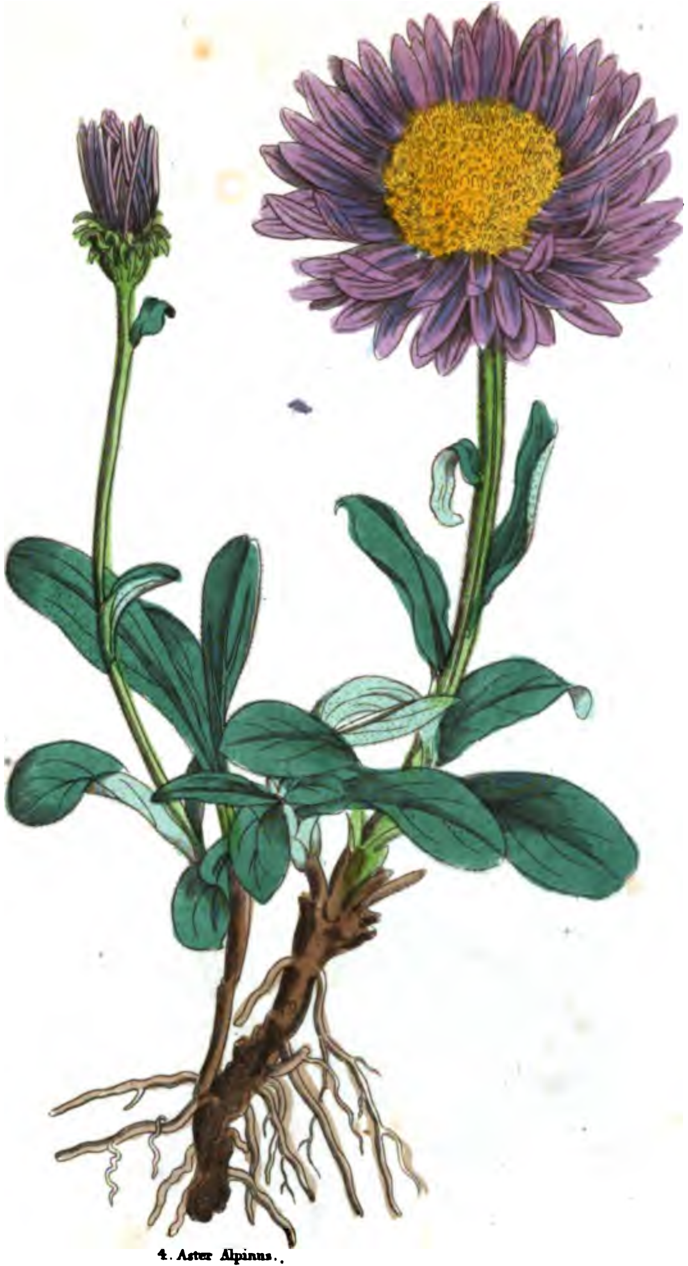


2 . Lupinus perennis.

64



3. Ixora flammea.



4. Aster Alpinus.

THE

MAGAZINE OF BOTANY, GARDENING,

AND

AGRICULTURE,

BRITISH AND FOREIGN.

NOVEMBER, 1836.

On the Cultivation of some of the most select Biennial and Perennial Plants, with some Remarks upon their Beauty.

————————" A breath of unadulterate air,
The glimpse of a green pasture, how they cheer
The citizen, and brace his languid frame!
E'en in the stifling bosom of the town,
A garden, in which nothing thrives, has charms
That sooth the rich possessor; much consoled,
That here and there some sprigs of mournful mint,
Of night-shade or valerian, grace the wall
He cultivates. These serve him with a hint
That nature lives; that sight-refreshing green
Is still the livery she delights to wear,
Though sickly samples of the exuberant whole."

THESE elegant lines, from Cowper, are so full of beauty and soul-stirring spirit to every lover of Flora, that we have thought them peculiarly adapted to our present purpose, as an introduction to a few remarks upon some of our hardy and beautiful plants, which it is our present intention to make, and which we may, at some future time, carry out to a more extended length. Our observations will be confined to such plants as, in our estimation, are most deserving of the care, and are most likely to reward the novice in the culture of flowers. We shall not address ourselves to the initiated cultivator; he will seek better authority, and more detailed information; it is to those who have taken only their first steps in the garden that we would presume to offer ourselves as a guide—it is the young and the fair that we wish to see engaged in floral pursuits, and, if they are still more ambitious, in the science of botany. It requires but little effort to begin. The task will not be one of labour, but of pleasure, and perseverance will ensure a reward. Flora may be said rather to give fruition than hope; her rewards are ever in anticipation, and are ever at hand. Let us but for a moment look at her progress; after the healthy recreation of preparing the soil to receive the seed, and it is deposited, the spot becomes sacred, and an object of our anxious care; the germination of the seed is watched until the plant in its first state is realized; over this we hang in fond anticipation of all that shall hereafter delight our senses, in richness of colour, delicacy of texture, or sweetness of perfume, and in some cases with all these qualities combined: with the strength of the plant our cares and expectations keep pace, our sympathies are all called into action, the rude wind or the scorching rays of the mid-day sun are to be provided against; in some cases, the foliage of the plants, of the same kind, are day by day examined to ascertain if they in any manner differ from each other in form or colour; the least shade in colour, the least alteration in form, raises the hopes of the florist; he is full of expectation that his labours will be rewarded with a new variety, that may add lustre to that particular class of flowers, and that his friends and the floral world may delight in beholding one of the handmaids of his goddess in a *new dress.* Such are the delights of the lover of nature, and with all this nearly parental care, he may mingle better feelings—he may, in the midst of his ecstacy of admiration, remember the Divine Being who fashioned and painted the object of his pleasure. The botanist with the world before him, the king and the nobleman with his parks, the opulent merchant with his villa, the cottager with his garden, and the mechanic with his pots and tubs placed at his window, while he toils for his daily bread, are each rewarded to the full, out of the never-failing source of pleasure which the garden can dispense. To such of our readers as have made a beginning in the garden, we would say, persevere; to those who think of doing so, we would say, delay not; to such as suppose they have no means, we will give a picture drawn from our favourite and amiable poet.

" The most unfurnished with the means of life,
And they, that never pass their brick wall bounds
To range the fields and treat their lungs with air,
Yet feel the burning instinct: over-head
Suspend their crazy boxes, planted thick,
And watered duly. There the pitcher stands,
A fragment, and the spoutless tea-pot there—
Sad witnesses how close-pent man regrets
The country: with what ardour he contrives
A peep at nature, when he can no more."

None need be discouraged; a violet will smell as sweet bloomed in a broken tea-pot as in a China vase; the rose will bloom as fair, and shed its perfume as far, though bloomed in the poor man's tub or crazy box, as in the rich parterre.

Anemòne hepática, L.; The Hepatica.—This flower lies a year complete, with all its parts, within the bud, and is one of the most eminent beauties of the spring. The flowers appear in March; and the double sorts, which have fairer and more durable flowers than the single ones, make a beautiful appearance upon the borders of the pleasure garden. There are many varieties of this species, as, 1, single and double blue; 2, single and double red, or peach-coloured; 3, single and double white; 4, single and double variegated red and white; 5, single and double violet-coloured; 6, with striped leaves. This plant is found wild in Denmark, Sweden, Switzerland, France, Spain, Italy, and other parts of Europe; and thrives in a good rich, loamy soil facing the east; cold does not injure them, and they do best when only exposed to the morning sun. They are increased by parting their roots every third or fourth year, as soon as the flowers begin to fade. It is a perennial.

Antirrhìnum màjus; Great Rock Toad-flax, or Snap-dragon. These flowers are many of them large and handsome, but some persons consider them coarse; which, indeed, is the case with many of the most splendid flowers, as the hollyhock and the sunflower. They are, however, very magnificent, particularly the great snap-dragon. The flowers of this species are red, white, purple, yellow, or a combination of any two of these colours. They love a dry soil, and as there is a very great variety of this plant, we would recommend the var. píctum, coccínea, and spártium. They are increased by cuttings planted in the summer months; and new varieties may be obtained from the seed—the roots are biennial.

Aquilègia vulgàris; Common Columbine.—It is a perennial, and may be increased by dividing the roots. They vary much by culture, and are found of almost every colour: blue, white, red, purple, flesh-coloured, chestnut-coloured, and striped or variegated blue and purple, blue and white, and red and white. They will do well in almost any soil; two or three of the best varieties should be cultivated.

Coreópsis; it is called by gardeners, the *Tick-seeded Sunflower*, the seed being like a tick or bug. There are many varieties of this plant. C. lanceolàta, *spear-leaved Coreopsis*, is the most showy, and deserves a place in every garden. It is propagated by parting the root in the autumn, and loves a rich strong soil; it is a perennial.

Pulmonària virgínica; *Cowslips of Jerusalem.*—In favourable seasons the flower-garden owes much of its gaiety to this elegant plant, and at a time when ornament is most desirable. It generally blooms early in May. It should be planted in a dry soil; the roots run deep in the ground, and would rot with much moisture. This is a perennial, and may be increased by dividing the roots. It loves a pure air, and if sheltered from cold winds while in bloom, will amply repay the trouble. The colours are many, not only on the same cluster, but on the individual blossom, appearing various shades of red and blue, and these shades continually changing. Drayton places this flower in such honourable company, as gives us good reason to believe that he held it in great esteem.

"Maids, get the choicest flowers, a garland, and entwine,
Nor pinks, nor pansies, let these want; be sure of eglantine,
        See that there be store of lilies,
        (Called of Shepard's daffodillies)
With roses damask, white, and red, the dearest flower-de-lis,
The cowslip of Jerusalem, and clove of Paradise."

Vìola odoràta; *Sweet Violet.*—This favourite flower, so universally esteemed for its fine odour, is a native of every part of Europe. There are the following varieties of the common violet; the single blue and white, the double blue and white, and the pale purple; all of which are generally preserved in gardens. The double blue, and double white, are the most desirable. They are so fragrant, that a single blossom will perfume a very large room. They are perennial, and may be propagated by parting the roots in the spring or autumn; they love a bank facing the east, and shade after 10 o'clock A. M.

This flower has long been a favourite in England, and poets have sung its praises. If we could touch the lyre, we would follow their example, but must be content to give one or two quotations. In describing a little woodland work of violets, Mr. Keats has the following passage:—

————————"where to pry aloof,
Atween the pillars of the sylvan roof,
Would be to find where violet beds were nestling—
And where the bee with cowslip-bells was wrestling."
"Gay villagers upon a morn of May,
When they have tired their gentle limbs with play,
And formed a snowy circle on the grass,
And placed in midst of all that lovely lass
Who is their queen;—with her fine head
Crowned with flowers, purple, white, and red;
For there the lily and the musk-rose, sighing,
Are emblems true of hapless lovers dying:
Between her breasts, that never yet felt trouble,
A bunch of violets, full-blown, and double.
Serenely sleep."

And, again, how beautiful is the following passage in the Winter's Tale:—

————————"violets, dim,
But sweeter than the lids of Juno's eyes,
Or Cytherea's breath."

Delphínium chinénse flòre plèno; *Double-flowering Chinese Larkspur.*—This plant must be placed at the head of all the herbaceous perennial flowers. It makes a most magnificent appearance in the garden, from the middle of June until it is cut down by the frost; a strong root will throw up from six to ten stalks, and if grown in good strong loamy soil, will reach the height of from four to six feet; the flowers are of a fine azure blue colour, and appear as if they were bronzed. It has no superior, and but few equals; it is a prince, full of beauty, grandeur, and magnificence. It may be propagated by parting the roots in the spring or autumn.

On the Cultivation of several of the most beautiful Species and Varieties of Cactus and Cereus.

THE Cèreus speciossíssimus is far more robust in its habit of growth than the C. grandiflòrus. The stem of the plant is quadrangular, or four-sided; and, when in a healthy state, the young growths are of a brownish colour, which is a good criterion for any one who is unacquainted with its habit of growth, to judge of its vigour.

One of the most important points in this genus of plants is, in keeping them in a high state of health, for such always produce the largest and most elegant flowers. It should be remembered, that all succulent plants, or plants similar to the one I am now speaking of, imbibe moisture very copiously in damp weather, and part with it very sparingly in hot weather; and any one who is not already acquainted with this fact, or has not yet observed this much, can never expect to rise above mediocrity in the cultivation of this tribe; we have no foliage that wilts down when the roots are perishing with drought, as in most other plants, but the stem will in a little time become soft to the touch, and the meagre, shrivelled appearance, so much complained of, is nothing more nor less than the result of bad treatment. Immediately after a few cloudy damp days, plants, in a healthy state, generally wilt considerably, when the sun breaks out suddenly with intenseness of heat, although, at the same time, the roots are probably saturated with moisture. The compost recommended for the night-blooming cèreus, in my former paper, should be used for this and all other plants of this genus. The old custom of making a compost of lime-rubbish, sand, and a portion of soil, it may be argued, has been in use nearly a century, and that numerous instances can be cited of the success of different individuals. Nevertheless, I know of no reason why we are not at liberty to try some new mode of culture, if out of the common track; and I am convinced, that whoever will try the compost, (which, by the bye, is as cheap and as easily procured as any other,) will meet with ample remuneration for his trouble.

This very desirable plant puts forth its flowers in the months of June and July, sometimes in May, as a great deal depends on the temperature of the house the plant is grown in. Size of the flowers, four or five inches in diameter: colour, a beautiful crimson, the inner petals elegantly shaded with purple: the stamens, which are numerous, are bundled together, and are as long as the petals of the flower. The styles and anthers are white, and present an elegant contrast with the other parts of the flower. By shading the flowers from the hot sun, they may be kept in full bloom four or five days. The plant should be placed in such a situation in the greenhouse, that there will be a free current of air in every part of it, and by no means allow other strong, growing, and straggling plants to overshadow it. No hot or greenhouse collection can be called complete without this splendid species.

Some cultivators recommend the drying up of the plants, to force them to flower more abundantly; this is what I call flowering the plant prematurely—for even if a few more blossoms are obtained, which I have my doubts of, the yellow, sickly appearance of the plant, when thus treated, is enough to condemn the practice.

This species is easily propagated by cuttings, and a strong healthy one is preferable to a sickly plant; and if carefully packed in soft paper, and placed among clothes in a travelling-trunk, or among any kind of dry goods, could be taken to almost any distance required. All that is necessary, after taking the cutting from the plant, is to lay it on a shelf in a dry room, two or three days, so that the wound may heal over.

A cutting such as just mentioned, will, with good treatment, probably flower the second year. The dark-brown vein, that leads from the centre of the stem to the bud, which may be immediately observed, is almost a sure sign of a flower. I say *almost*, because sometimes it turns out to be a lateral growth. In order to force the plant to flower, it is recommended by some cultivators to cut off about half an inch of the extremity of the shoot; this often has the desired effect; although it is frequently the case that the plant, by thus stopping it, is stimulated to make lateral *growths.—Amer. Gard. Mag.*

APPLICATION OF BOTANY TO MEDICINAL PURPOSES.

All the classes into which the immense kingdom of vegetables is subdivided are tributary to medicine. They enrich the Materia Medica with its most useful articles. Each family of plants may be considered as the copious source from which the practitioner skilled in botany may seek the means adapted to resist the different causes of the innumerable evils which afflict the human species; to change the different modes in which our organs are affected by them; to contribute, in one word, to the establishment of that perfect equilibrium in the faculties and functions of the constitution, which secures health.

As the vegetable kingdom is the department in natural history most productive of medicinal substances, it cannot but be felt how important its study must be in medicine. But it is particularly in materia medica and therapeutics that botany renders the greatest services. It enables the physician to make the best choice of those plants which are endowed with the most active properties; it has the invaluable advantage of supplying, instead of exotic medicines, of which he is often deprived, spontaneous productions that he finds at every step.

Independent of these advantages, the botanical physician will avoid the dangerous errors to which ignorance of falsified or adulterated drugs must necessarily expose him. He will avoid the fearful blunders made by those who do not know how to distinguish the genera and species of plants, who are daily confounding poisonous with harmless plants, salutary and medicinal plants with those which are useless, or the properties of which are unknown.

It is well known how often the Hemlock (*Conium maculatum*) has been confused with the common Fool's Parsley (*Æthusa cynapium*), sometimes with the recumbent Chervil, sometimes with wild Chervil (*Chærophyllum sylvestre*), and sometimes with the Water Hemlock (*Phellandrium aquaticum*), &c. &c.

Professor Gouan, of Montpellier, informs us, in his Lectures on Botany, that he had seen an extract prepared from the wild Chervil instead of the Hemlock; and Mr. Thou, a physician and learned botanist, told me, that he had seen the same error made with the *Scandix anthriscus*. What a mistake! and yet there are men in the profession who will condemn a knowledge of botany.

We can all recollect that the Hellebore of Hippocrates was for a long time confounded with other plants of different genera. M. Lemonier informs us, that at Paris the stinking Hellebore (*Helleborus fœtidus*) was employed in its stead. According to Vogel and Hoffman, the Germans used *Adonis vernalis* and *Arnica montana*. Haller and Albert discovered that it was confounded with the root of *Polygonatum*. Loesche disclaimed against the use of the green Hellebore (*Helleborus viridis;*) Schulzius against that of the Aconite, the root of which was substituted for that of the true Hellebore. And indeed this active remedy was confounded with the roots of *Trollius Europæus, Astrantia major, Actæa spicata*, &c.

This fatal error lasted for several centuries; and it is easily conceived that the employment of vegetables endowed with such different properties, must have been attended with the most fatal results; and it is probable that this error would never have been rectified, says Mr. Pujade, had it not been for the inquiries of Professor Gouan.

This celebrated botanist, directed by Lemonier and Lieutaud to solve this problem, demonstrated that the plant employed by Hippocrates in the treatment of mania was the *Helleborus orientalis amplissimo folio* of Tournefort, which corresponds with the *Helleborus niger* of Linnæus, the root of which is blackish, of a bitter taste, and a fœtid disagreeable smell.

Errors like these, resulting from an ignorance of botany, are of the greatest importance. They not only essentially injure the reputation of the persons by whom they are committed, but may also have the most lamentable results in compromising the lives of patients. Let us add, that this shameful and afflicting negligence often causes unjustly the absolute proscription of a precious medicine or of a plant of the greatest utility.

It is therefore of the utmost importance for the physician to be well acquainted with botanical characters, by means of which the genera and species of plants are to be distinguished. This knowledge will assist that of their physical and medical properties. But in regard to this, nothing is more useful to throw light on the researches of these properties than the study of the natural families, that is, of the science of the affinities which exist between certain parts of plants.

It is also with the assistance of this study that new remedies may be discovered, and the extent of the Materia Medica enlarged.

Rod. Jacob Camerarius, of Tübingen, was the first medical naturalist who affirmed, that plants coinciding in their exterior forms were allied by their properties. (*Diss. de convenientia plant. in fruct. et virib.* 1699).

Isenflamm (*Method. plantar. Medic. clinicæ adminicul.*) Wilcke (*De usu syst. sexualis in med. Diss.*) in 1764; and Gmelin (*Botanic. et Chem. ad midicine applic.*) in 1755, all affirmed that the virtues of plants might be known by comparing their exterior forms, or in taking for guides the natural and proper chaters of each family.

Linnæus, that celebrated botanist, greatly strengthened this opinion by the following rule, that plants of the same genus had similar properties; that those of the same orders had neighbouring properties; and that those of the same class even had analogies in their properties. *Quæcunque plantæ genere conveniunt*, says he, *etiam virtute conveniunt; quæ ordine naturali continentur, etiam virtute propriùs accedunt; quæque classe naturali congruunt, etiam viribus quodammodo congruunt*, (Diss. de virib. plant. prop. a Frid. Hasselquist in Amœn. academ. i. p. 427, Philos. Botanica, virtutes, § 337).

M. de Jussieu adopted the same opinion, which he developed in an excellent essay, inserted in the Collection of the Royal Society of Medicine of Paris for the year 1786, vol. viii. p. 188.

But no naturalist has carried the developments of this theory so far and in so luminous a style as M. De Candolle, in his learned dissertation, entitled, "Essay on the medical properties of plants, compared with their exterior forms and their natural classification, according to the method of M. de Jussieu." (Paris, 1804).

This illustrious botanist and distinguished physician demonstrates in this work, by proofs deducted from theory, observation, and experience, that there exists an analogy between the general properties of each family and the exterior forms of plants, although very respectable authorities, and amongst them Vogel, Plaz, and Gleditsch, had strongly opposed themselves to its possibility. (*J. G. Gleditsch Diss. de Method. Bot. dubio et fallacio virtut. in plant. Judice Lips.* 1742.)

At the present time this doctrine, far from being fallacious, is considered by men of the greatest merit, as positive and very advantageous. The labours of the chemist furnish daily proofs of this truth; and, indeed, what other science is more proper to investigate the medical, alimentary, and poisonous properties of plants than chemistry, as it succeeds in revealing their essentially active principles?

It must be conceded, that if the chemists of past centuries had a high opinion of the analyses of medicines, which they made in order to discover their medical properties, we must be permitted to entertain great confidence in those which are furnished us by the learned chemists of the day, and amongst them by Vauquelin, Chevreuil, Pelletier, Braconnot, Boullai, Planche, Parmentier, Prout, Thompson, Berzelius, &c. Indeed these analyses give us an exact knowledge of the principles which enter into the composition of vegetable products; they make us appreciate with precision, the respective qualities of each of these principles, whether they are found solitary, or in a state of conjunction with either fixed (as often happens) or volatile principles.

But this is not the place to expatiate on the salutary influence which chemists assume in materia medica. It is just, however, to observe, that if the physician ought to be versed in the study of the natural sciences, and of botany in particular, he ought not to be a stranger to chemistry. He will undoubtedly, with such information, be enabled to observe, more judiciously, the results of the action of medicinal substances, introduced into a deranged state of the constitution, and will be more capable of fixing the medical properties of those substances.

Let us now return to the advantages arising from a knowledge of the law of analogy, between the virtues of plants and their exterior form.

Drapenaud and De Candolle affirm, that it is on this law that rest the labours of the physician, the physiologist, and the experimental chemist, who endeavours to substitute indigenous medicines for exotic ones.

M. Loiseleur Deslongchamps, reflecting on this subject, "does not think that it is necessary to procure, from another hemisphere, all the drugs which we employ. He thinks that when the properties of the vegetables of France come to be examined with care, all the necessary remedies will be found amongst them, and that they will be as good as those, which, by long abuse, are still bought in the most distant countries." (*Rech. Hist. Botan. et Medic. sur les Narcisses indigènes*, 1810, p. 17.)

It is also very probable, says Mr. Pujade, after M. De Candolle, that the vomitive properties of the root of violets would be unknown without the analogous knowledge of the Ipecacuanha, which is known to be procured from two different genera; the white from the *Viola Ipecacuanha*, which grows in Brazil; the grey from the *Psychotria Calicocca;* and the brown from the *Psychotria emetica*, which are indigenous to Mexico.

Again, we should perhaps be unacquainted with the purgative powers of our Bindweeds (*Convolvulus*), and of our *Rumex*, without the Scammony procured from the *Convolvulus Scammonia*, and without the Rhubarb, which is the root of *Rheum palmatum undulatum* and *Rhaponticum*, plants of the same family.

It is according to the laws of analogy, that Forster, finding the *Lepidium oleraceum*, in the South Sea Islands, used with great success as an antiscorbutic; and that Jussieu, Duhamel, and Lemery, have demonstrated, that the *Polygala* of Europe was employed for the same purposes, and with as much success in pleurisy as the *Polygala Seneka* of Virginia.

It is in consequence of this law, founded on the similarity of botanical and medicinal characters, that the Gentianeæ, on account of their bitter principle, are considered as excellent tonics, stomachics, and febrifuges; that the Cruciferæ, which contain a bitter and ammoniacal juice, are thought very good stimulants of the lymphatic system, and of course the best antiscorbutic and scrofulous vegetables; that the Liliaceæ and Colchiceæ, the bulbs of which contain a very bitter gum resinous principle, have stimulating, energetic, and even poisonous principles; that the grains of the Gramineæ being farinaceous and containing much gluten, are eminently nutritive; that the Thymeleæ, the bark of which is very caustic, are rubefacient and blistering; that the Papaveraceæ, having a milky, disagreeable, and narcotic juice, have all that powerful somniferous property, which has, at the same time, the power of allaying pain; that the Malvaceæ, being mucilaginous, are emollient and softening; that the Euphorbiæ, containing an acrid and caustic gum resinous juice, are emetic and diuretic; that the Umbelliferæ, having in general aromatic seeds, a property owing to the presence of an essential oil, are stimulating, tonic, carminative, and antispasmodic; that the genus *Cinchona*, so rich in species, having a bitter and astringent bark, has been hitherto considered as the most powerful tonic, and the most certain febrifuge; and that the Coniferæ are stimulating and diuretic, on account of the resinous aromatic juice, analogous to turpentine, which they possess.

This law of analogy certainly has exceptions, even amongst certain species of the same genus, but they are small in number, and depend oftener, as M. De Candolle observes, on our ignorance of botany, on the soil in which the plant grows, on the climate it vegetates in, on the severity of the seasons, on the influence of light, heat, cold, and the diseases to which plants are subject.

This law may be applicable in classes, the families of which offer striking differences; for example, in the Cryptogamia of Linnæus, if exceptions are found, there are also many points of similarity, which bring together many genera in one family, whether with regard to their botanical characters or medicinal properties. Thus the marine Algæ are all closely connected by their exterior resemblance, their habitation, their physical qualities, their chemical principles, and their medical properties; a great number of Fuci, Ceramias, Confervas, and Ulvas, possess the vermifuge properties in as high a degree as the *Fucus helminthocorton*. It is worthy of observation, that the Corsican moss, obtained in the trade, is only a mixture of many species of marine Confervæ and Ceramias. M. De Candolle found 18 different species, and the *Fucus helminthocorton* did not constitute one third part of the parcel he examined.

The same analogy has led to a knowledge of the anthelmintic properties of the roots of the large species of Ferns, of the tonic and nutritive properties of the foliaceous Lichens, of the Physica and Cladonia, of the poisonous effects of the greater number of Mushrooms, &c.

Medical experience has sanctioned all these discoveries of the properties of plants. It is the triumph of that great analogic principle, *Quod plantæ, quæ genere conveniebant qua vires etiam coinciderent.* (Lin. amœn. acad. vires. plant. t. i. p. 240.)

But medical experience ought to anticipate the rights of chemical analysis and botanical analogy. The union of the insight furnished by these three powerful sources is absolutely necessary. When researches are being made on properties unknown amongst vegetables, medical experience is an essentially empiric mode. It could not proceed alone without being frequently exposed to imminent danger. Enlightened by the assistance of botany and chemistry, this mode is of the greatest importance, as it establishes the real properties of plants or of vegetable medicines.

Is it not true that a root, a bark, or a flower, endowed with a bitter juice, will be immediately considered as bearing tonic or febrifuge qualities; but if it is bitter and caustic will it not be said that it is irritating? Then, if it causes irritation, principally in the digestive organs, it may give rise to evacuations, either as a purgative or vomitive; it will be an emeto-cathartic or drastic, according to the power of its irritating and evacuating property. But this same substance may also be a strong and active poison. We have similar examples in the Euphorbia, the Elaterium, the Colocynth, the Croton. To this we should be exposed by recurring to medical experience only. But if chemical analysis is employed to operate on the substance of which we have spoken, and it is demonstrated that it possesses a bitter principle, in union with a gummy or gum resinous principle, or with a very active substance, *sui generis*, or with neutral or specific salts, or with some alcalis or acids, or again with some oily or volatile principle, shall we not have acquired a more exact and luminous knowledge of its virtues and usefulness in therapeutics ?

Add to this the knowledge you have anteriorly derived from the botanical relations which exist between the plant which has furnished the substance and those which compose the genus or the family to which it may belong, and you will have before you everything which can enable you to ascertain its mode of action with precision. Nothing will remain but to describe its more or less active properties, which may be applied more or less usefully in different diseases, which cannot but be the result of a long series of experiments. Then medical experience will be of the greatest utility.

For a long time medical empiricism has been the sole guide to the discovery of medicines. It was often founded on the instinct of animals or patients, who directed them to such and such a remedy, which proved useful. This empiricism must always be preceded by the application of the senses of seeing, tasting, or smelling, in order to appreciate the physical qualities of the taste, smell, or colour, proper to each substance. This analysis, on the part of our senses, particularly taste and smell, are certainly very essential, and the first to be employed. Frederick Hoffman, Hebenstreit, and Wedel, have given, on this subject, the best precepts and the most instructive lessons.

M. Virey justly observes, that those vegetables only, endowed with odorous and sapid principles, produce medicamentous actions ; while inodorous and insipid plants have few virtues, and are, at most, emollient and softening: hot and dry countries develope more especially the odoriferous and savoury properties of plants, and hence the aromatic and volatile oils acquire a delightful perfume in the ardent climates of the torrid zone. (*Virey, Remarks on the Medical Prop. of Vegetables, Journ. de Pharm. April,* 1820.)

Hippocrates, Theophrastus, Dioscorides, Galen, and Aëtius, were the first amongst the ancients who endeavoured to recognise medical properties by their taste. And amongst the moderns, Kœnig, Johnston, Femel, Cartheuser, Walter, and Linnæus, have published excellent Dissertations on this subject. The last of these authors establishes that plants having the same taste are probably endowed with similar properties. It is thus that bitter vegetables (amara) are only strengthening and antiseptic ; the sweet substances (dulcia) are laxative ; those which are acrid (acra) are heating and irritating ; the acerba are astringent ; the acids are refreshing ; the oily ones lubrefiant.

It is the same with the application of the olfactory nerves to discover the agreeable or fœtid properties of vegetable substances. Linnæus has also consecrated a Dissertation to this subject (*Amœn. acad,* vol. ii. p. 365), wherein we observe that aromatic plants (aromaticæ) increase the nervous influx and accelerate the circulation of the humours ; that the fragrants stimulate and strengthen the weakened nerves ; that the tetricæ, with a disagreeable and fœtid odour, calm the nervous system, and the hircinæ are aphrodisiac ; while the alliaceæ provoke transpiration, and are anthelmintic, &c.

Chance has also led to several very useful discoveries. We are indebted to it amongst the Indians for the febrifuge properties of the Peruvian Bark. But these discoveries are very rare and always imperfect ; those also which result from an analysis by the taste and smell are not sufficient, and might lead us into serious errors, if exclusive confidence was placed in them. Moreover, this knowledge is too closely allied with chemical analysis to be separable from it. This last, united with the trials in medicine, offers none of the inconveniences attendant upon all other means, particularly when preceded by researches founded on the analogous relations of vegetables.

In order to direct with success medical experiments, it has been thought necessary to make the first essays on domestic animals, the organization and habits of which are more closely allied to those of man. Cats and dogs have generally been preferred. It is very probable that as soon as a substance has been found to have a deleterious effect on these animals, it ought to be regarded as injurious to man. Essays made with much prudence and care on sick persons, or even men in perfect health, have subsequently proved whether it ought to be consigned amongst the poisons, or placed as a remedy amongst the other articles of the Materia Medica. We ought to cite, as remarkable instances of experiments, those of Professor Stork, on the *Conium, Aconitum, Colchicum, Hyosciamus,* &c. ; those of Dr. Alston on the narcotic effects of Opium ; those of Withering, Horn, Fowler, and Parkinson, on the *Digitalis purpurea ;* those of Greding, Hufeland, Munch, and Mayerne, on the *Atropa Belladonna ;* those of Horn, Hoffman, and Brugnatelli, on Camphor, &c. &c.

We here terminate these general observations. It seems to us, that, independently of the actual utility of botany in medicine being undoubted, we may conclude, from all that has been said, that in order to obtain a solid notion of the medical properties of plants, we must of necessity require—

First. The assistance of the law of botanical analogy, established between the families and genera of plants, in order to be able to judge, in the first instance, of their general properties.

Secondly. The assistance offered by chemical analysis, which reveals the constituent principles of plants or of their products.

And, *thirdly.* The assistance resulting from medical experience, which gives a knowledge of the mode of action of medicinal articles ; and, as a necessary consequence, of their particular or specific actions.

ON THE HOLLYHOCK.

The cultivation of this magnificent eastern plant is of great antiquity in this country. Its noble size, majestic height, and splendid flowers, could not fail to attract the attention of our earliest collectors of exotic plants ; and although we cannot state the time when the hollyhock was first brought to this country, it was certainly much earlier than the date mentioned in the *Hortus Kewensis*, or any other modern work on plants that we have been able to consult. Dr. Turner speaks of it as a familiar plant in his work, dated 24th of June, 1564 ; and Gerard, in 1597, observes, that it was then sown in gardens almost everywhere.

The derivation of the English name of this flower may be traced to the Saxon language, the old name of holyoak being the same as holibec. Mortimer retains the old name of hollyocks for these plants, in his work on husbandry, as late as the year 1707, wherein he says, " Holyocks far exceed poppies for their durableness, and are very ornamental." Turner spells it holyhock, and Gerard, and after him, Parkinson, calls it hollihock.

The French, who consider this plant as a native of Syria, call it by several different names, as *rose trémière, rose d'outre mer, rose de mer, rose de Damas.*

In floral language, the hollyhock is figured as the symbol of fecundity, and its extreme fruitfulness seems to justify the device.

These plants grow naturally in various eastern parts of the globe. It is common in China, from whence the seeds of the tall as well as the dwarf hollyhock have been frequently received. Pliny speaks of this flower in the fourth chapter of his twenty-first book, where he describes it as a rose growing on stalks, like mallow. A late traveller in Africa says, the hollyhock is also a native of the Marootzee country, where he found it growing wild among the rocks around Kurreechane ; but these appear to have been only of a yellow colour.

We have but few flowers that contribute more to the embellishment of large gardens than the hollyhock, although the hardy nature of hollyhocks, and their easy propagation, have rendered them so common that they are much less regarded by the generality of florists than they deserve, since this yields to no flower for the grandeur and beauty of its appearance, as well as the great variety of its colours, which embraces all the shades of the rose, from the palest blush to the deepest carmine, and from a pure white; the yellows are equally numerous until they reach to the richest orange, from which the colour is carried on to a dark chestnut. Others are dyed of a pale reddish purple running up to a black.

The tall hollyhock is not adapted for the small parterre, its aspiring height befits it for a nobler situation, and it rises with a degree of dignity from amongst clumps of flowering shrubs that is not excelled by any plant whatever. But to give full effect to this flower they should be planted in clumps of from five to ten plants, according to the size of the grounds, and each of these clumps should be formed of one colour, contriving to have a clump of the darkest coloured flowers between two plantations of the paler colours.

Where the grounds are very extensive, clumps of mixed varieties may be admitted, but these never tell so well in the perspective as a mass of a single colour. It considerably adds to the beauty of those plants when they are so placed as to appear emerging from among dwarf shrubs, where the lower part of the stalks are obscured. They must not be planted too near each other, as every stem of flowers should be seen distinct, and when they require support, they should each have a separate stake, for when several are pressed together, the flowers have not room to display their beauty, and they take a stiff and unnatural appearance instead of that careless freedom which constitutes the beauty of all plants.

> "Yet in this wild disorder *art* presides,
> Designs, corrects, and regulates the whole,
> Herself the while unseen."

The hollyhock may be planted so as to ornament the bounds of gardens, by forming clumps at the angles and at irregular distances near the fence, so that they do not form a straight line, for such an arrangement would only make the limits of the ground more conspicuous. For small gardens, or where the situation is much exposed to the winds, the dwarf hollyhock is the most desirable, and when some of these are planted in front of the taller kind, it adds considerably to the beauty of the group. When the children of the lower classes of society are become more civilized, and their parents sufficiently enlightened to instruct them in their duty, so that their amusement may not consist in idly destroying what cannot benefit them, but materially injures their more polished neighbours, the hollyhock will be planted in the hedges of our fields, and the whole appearance of the country be much improved by relieving the uniformity of the generality of fences; and considerable benefit would at the same time be received by those cottagers who have the prudence to give attention to the hive, since the late season at which the hollyhock flowers, gives the bee a second season for collecting its sweets; and when a wet or cold summer has impoverished the hive, or brought sickness into the swarming community, these autumnal flowers will afford it relief, and give the bees strength to endure the winter, which is also considerably shortened to them by the aid these flowers give, to enable them to subsist without falling on their store, at too early a season. The hollyhock is also likely to hold a higher rank in rural economy than that of feeding bees. For some years past it has been known that a good strong cloth may be made from the fibrous bark of the flower-stalks of this plant; and in the year 1821, about 280 acres of land, near Flint, in Wales, were planted with the common hollyhock, with the view of converting the fibres of this plant into threads similar to that of hemp or flax. In the process of manufacture it was discovered that the plant yields a fine blue dye, equal in beauty and permanence to the best indigo; this important discovery cannot fail of rendering beneficial consequences, both in a commercial and agricultural point of view.

AGE OF TREES.

The growth, duration, and the causes which conduce to the decay of timber-trees, is a question that bears directly upon points of general interest, and of great practical importance, and is not one of mere curiosity.

Man loves to contemplate and to ponder on the wrecks of past ages, which have escaped the destructive power of time. The smallest remains of human art, the least fragment of those fossil stones which are records of the ancient revolutions of the earth, rivet his attention, and excite his lively curiosity. An interest still more natural and more affecting, seems to belong to the living memorials of distant ages; still, life in general is so short, that living monuments will always seem as if only of yesterday, when contrasted with those that are lifeless. The longevity of certain trees is a question which has a genuine interest. If we set any value upon the records of antiquity, how much shall we be gratified to learn that such a tree is cotemporary with the most ancient generations! In certain cases, this knowledge may elucidate the history of monuments, as some monuments may help to throw light upon that of trees which have long been neighbours to them. This question may also become auxiliary to the history of the globe itself. If some researches of this kind were made in volcanic or madriporic isles, it is probable we might discover some data of their origin. If we reflect upon the means of attaining the solution of the question, we perceive they are all founded upon a very exact appreciation of the habitual laws of the growth of trees; and this knowledge may be directed to clear up many parts of vegetable physiology.

It is chiefly to annual and biennial plants that what may be called a precise period of duration is fixed; a period determined by the production of their fruit, and not capable of being prolonged beyond that event, except by artificial means. But a very large proportion appears to be capable of an almost indefinite period of existence, if it were not for accidents and disease, independent of old age. This proportion of the vegetable kingdom, whether herbaceous, shrubby, or arborescent, may be classed under two principal modes of growth.

1. *Exogenous* or *Dycotyledons.*
2. *Endogenous* or *Monocotyledons.*

The *first*, which is by far the most numerous, increase from the beginning, simultaneously in length and diameter, but principally in length, by the annual insinuation of longitudinal fibres into a space beneath the bark, and on the outside of the wood near the circumference. The way in which their age is computed is two-fold; first, by comparing them with other old specimens, the rate of growth of which is known; and secondly, by cutting out a portion of their circumference, and then by carefully examining the end formed by the saw, we shall find the surface to be composed of circles, one within another, from the bark to the centre; and by counting their number, it will give the term of its duration.

It appears that the sap-vessels, under the bark, which are in a soft spongy state during the summer, harden in the winter, and become firm wood. In the next spring, fresh sap rises in another circle of vessels, pushing the bark outwards, and, in its turn, changes into the close-grained proper wood of the tree. Thus the whole is enlarged, and these annular and annual additions are in general clearly discernible. In looking at the end of a piece of timber, or the arm of a tree newly cut, the parts within two or three inches round the edge look whitish, whilst that towards the middle is much darker. The whiter part is a younger and softer wood; and because the juices of the tree most abound therein, workmen call it the *sap*. The dark part is the *heart*, and is, in fact, the only part fit for use, where good timber is required. For in exogenous trees, the woody cylinder of one year is divided from the succeeding one by a denser substance, which distinctly marks the line of separation between the two years.

The first of these methods is sufficiently correct to give at least an approximation to the truth, and the latter would be absolutely correct, if one could be quite sure that observers provided against all possible causes of error. But it has been shown (in Dr. Lindley's *Introduction to Botany*, p. 66), that in consequence of the extreme inequality, as regards thickness, of the annual layers of wood on opposite sides of a stem, a person who judged of the whole age of a tree by the examination of the layers of the stunted side only, would commit errors to the amount of sixty per cent. and more.

The manner of growth in exogenous trees being such as has been described, they may be compared to a succession of hollow cylinders, of gradually increasing diameters, and sheathing one the other. This being the case, and the last cylinder having its own independent vitality, it is apparent that under constantly favourable circumstances, trees of this kind may continue to exist until the end of time, there being no conceivable manner in which their death can be brought about, except by accident. There is, indeed, nothing physically impossible in the notion, that some individuals now existing may even have been silent witnesses of the Noachian deluge. To the natural historian no subject is more interesting than the still life memoirs of the vegetable world. He finds no retrospects more pleasing than those which relate to woodland scenes; no task more grateful than a contemplation of those vast "inheritors of the earth," which adorn and beautify our groves and lawns.

Amongst the many remarkable cases upon record, of the extreme old age which some trees attain, the following are some of the more interesting:—

In forest annals, no tree affords so many fond, so many grand memorials as the *oak;* no object is more sublime than this stately plant; and yet, as Pontey truly says, "even our *mushrooms* are tended with a nurse's care, while the *oak*, the pride of our woods, the chief material of our navy, and consequently the bulwark of our country, is (too often) left to thrive or rot by chance, unheeded, if not forgotten." So great indeed has been this apathy, so extraordinary the perverseness which has prevailed on this subject, that the destruction of our forests has actually been regarded as a matter for exultation. In one of the returns from Suffolk, to the Commissioners of Land Revenue, it is stated that "timber is decreased in the woods and hedgerows, as it ought to be;" and in some of our agricultural reports, oak is disparagingly mentioned as the mere weed of the country. Happy is it for those who love to roam in woodland scenery, that "on thousands of acres" the oak has been looked upon as the mere weed of the country; for it is owing principally to this that many fragments of our ancient woods have been suffered to escape the ravages of *improvement*.

The reckless system of extermination which has been pursued from age to age, has indeed so grievously thinned our forest lands, that of many celebrated woods, scarcely anything but the name survives. And yet, notwithstanding all this rage for destruction—notwithstanding the fearful devastations which the last two centuries have witnessed, few civilized countries possess so many "chieftain wonder trees" as our own. Perhaps no landscape feature is more missed by Englishmen abroad, especially when travelling through France, than those noble monuments of past time, which have given beauty to the land, and shelter to its inhabitants, for so many generations. This may probably be owing to the prejudice against coal as fuel, which prevails so extensively abroad, and which leads to the condemnation of trees for fire-wood, when their caverned trunks no longer fear the axe, nor dread being converted into timber.

In the present day especially, the slightest whim of the owner fells an ancient tree, reverenced by his forefathers during many centuries; an instant destroys that which pitiless time had spared for ages—that which so long a lapse of time can alone replace. It is not so in the East; in those countries where shade is at the same time more wanted, and less frequent, a large tree becomes to the inhabitants, especially if it grows near their dwellings, a precious object, and is equally respected with the far less admirable works of art with which the ancients covered their classic lands. "Even among the Turks," says a traveller, "it is an enormous crime to cut down old trees, and all the neighbourhood would be ready to make any sacrifice to preserve the hospitable shade. I have often seen shops built beneath a great plane tree, which appeared to come out of the roof, and to cover them with leaves, and the walls were traversed with the branches, which the owner feared to lop off. Old trees," he continues, "are generally surrounded by a fence or bank, which serves to cover and defend them; and this in the common fields, where they do not belong to any one in particular." How far are we from such a conservative spirit!!!

Amongst ancient trees, there are few so worthy of attention as an oak which may be seen in the Pays de Caux, about a league from Yvetol, in the burial ground of Allonville, and close to the church. This oak has sessile leaves and acorns, on footstalks, and is therefore of the true naval species. Above the roots it measures upwards of thirty-five English feet round, and at the height of a man, twenty-six feet. A little higher up it extends to a greater size, and at eight feet from the ground, enormous branches spring from the sides and spread outwards, so that they cover with their shade a vast extent. The height of the tree does not answer to its girth; the trunk, from the roots to the summit, forms a complete cone, and the inside of this cone is hollow throughout the whole of its height. Several openings, the largest of which is below, affords access to this cavity. All the central parts having been long since destroyed, it is only by the outer layers of the *alburnum*, and by the bark, that this venerable tree is supported, yet it is full of vigour, adorned with abundance of leaves, and laden with acorns.

Such is the oak of Allonville, considered in its state of nature. The hand of man, however, has endeavoured to impress upon it a character still more interesting, by adding a religious feeling to the respect which its age naturally inspires.

The lower part of its hollow trunk has been transformed into a chapel of six or seven feet in diameter, carefully wainscoted and paved, and an open iron gate guards the humble sanctuary. Above, and close to the chapel, is a small chamber, containing a bed; and leading to it there is a staircase, which turns round the body of the tree. At certain seasons of the year divine service is performed in this chapel.

The summit has been broken off many years, but there is a surface at the top of the trunk, of the diameter of a large tree, and from it rises a pointed roof, covered with slates, in the form of a steeple, which is surmounted with an iron cross, that raises itself in a truly picturesque manner, from the middle of the leaves, like an antique hermitage, above the surrounding wood. The cracks which occur in various parts of the tree are, like the fracture whence the steeple springs, closely covered with slates, which, by replacing the bark, doubtless contributes to its preservation. Over the entrance to the chapel an inscription appears, which informs us that it was erected by the Abbé du Detroit, curate of Allonville, in the year 1696; and over the door of the upper room is another, dedicating it "To our Lady of Peace." One cannot give to the oak of Allonville less than nine hundred or one thousand summers. Perhaps, in its youth, it lent its shade to the companions of William the Conqueror, when they assembled to invade the British shore. Perhaps the Norman troubadour, on the return of the first crusade, there often sang to his admiring fellow-countrymen the exploits of Godfrey and of Raymond.

At the deplorable period when every thing belonging to religion was condemned, the revolutionists, having come to Allonville to burn the oak, were vigorously opposed by the country people, and the sanctuary was preserved.

In England there are many oaks larger and loftier than this of Allonville, but few that are so interesting. At Ellerslie, the birth-place of Wallace, three miles to the south-west of Paisley, stands an oak, in the branches of which, tradition relates that celebrated chieftain to have concealed himself, with three hundred of his followers. However improbable the latter circumstance may be, it is certain that the tree might have been a remarkable object even at that period; and if so, it must be at least seven hundred years old. Its branches are said to have once covered a Scotch acre of ground; but its historical interest has rendered it a prey to the curiosity of the stranger, and its limbs have gradually disappeared, and little now remains except its trunk.

Owen Glendower's Oak is situated at Shelton, distant about a mile from Shrewsbury. It has its name from a tradition of Owen Glendower having mounted this tree to gain a view of the battle of Shrewsbury, which was fought on the 20th of July, 1403, between the forces of Henry the Fourth, and those of Hotspur Percy. There is no difficulty in believing, from the present appearance of the tree, that it is old enough to have been of a considerable size at that time (four hundred and thirty-three years ago). It is still alive, and bears hundreds of acorns every year, though it has the appearance of great age, and is so hollow in the inside, that it seems to stand on little more than a circle of bark. At least six or eight persons might stand within it. The dimensions are as follow:—The girt at bottom, close to the ground, is forty-four feet three inches; at five feet from the ground, twenty-five feet one inch; and at eight feet from the ground, twenty-seven feet four inches. Height of the tree, forty-one feet six inches.

Major Rooke observes, it was perhaps the inland situation of the little forest of Salcey, ten miles from Northampton, that caused some of its majestic oaks to escape the axe, until age had secured them from the claims of the dock-yard; and of these the great *Salcey Oak* is the most remarkable. Its circumference at bottom, where there are no projecting spurs, is forty-six feet ten inches; at one yard from the ground thirty-nine feet ten inches; at two yards, thirty-five feet nine inches; at three yards, thirty-five feet. Its circumference, within the hollow of the trunk near the ground, is twenty-nine feet; at one yard from the bottom, twenty-four feet seven inches; at two yards, eighteen feet six inches; at three yards, sixteen feet two inches.

The Major figures this living cavern, with an arched entrance on either side, closed with gates, thus forming an enclosure in which cattle might be penned; and adds, "From observations that have been made by naturalists on the longevity of the oak, there is reason to suppose that this tree is at least one thousand five hundred years old.

This outstrips the poet Dryden's praise, who estimates its continuance at nine hundred years, when he sings—

> "The monarch oak, the patriarch of trees,
> Shoots rising up, and spreads by slow degrees,
> Three centuries he grows, and three he stays,
> Supreme in state, and in three more decays."

Other oaks of this kind, though less remarkable for their size, are common in many parts of the country, and are known as *bull oaks*, from the circumstance of these animals taking shelter within them, which, when they are of smaller dimensions, they "effect not by going in and turning round, but by retreating backwards into the cavity, till the head alone projects at the aperture."

Mr. South describes one standing in the middle of a pasture, and bearing the most venerable marks of antiquity, which gives a name compounded of itself and its situation to the farm on which it grows, viz. *Oak-ley* farm; the hollow of this tree was long the favourite retreat of a particular bull. Twenty people (old and young) have crowded into it at the same time. A calf being shut up there on one occasion, its dam, a two-year old heifer, constantly went in to suckle it, and still left sufficient room within for milking her. "It is supposed," he adds, "to be nearly a thousand years old; the body is a mere shell covered with burly protuberances; the upper part of the shaft is hollow like a chimney. It has been mutilated of all its limbs; but from their stumps arise a number of small branches, forming a bushy head, so remarkable for fertility, that in years of plenty it has produced two sacks of acorns in a season. It measures in the middle, round the burls, twenty-nine feet three inches—little more than half the size of the noble Salcey patriarch. Circumference round the stumps of the old arms, thirty-one feet six inches, and in the smallest part (between two and three feet from the ground), its girth is twenty-six feet.

In the Bath Society's papers we have the dimensions of another very grand bull oak, in Wedgenock Park, Warwickshire, which measures at three feet from the ground, eleven yards one foot in circumference; at one foot from the ground, thirteen yards one foot; at six feet from the ground, twelve yards one foot. Its broadest side, seven yards five inches; close to the ground, eighteen yards, one foot, seven inches. Height of the trunk, only about four yards one foot. The inside quite decayed, and when the writer saw it, a cow and a sheep had sheltered themselves within it. The head was very round and flourishing.

Martyn mentions *Fisher's Oak*, about seventeen miles from London, as a tree of enormous bulk, the trunk alone remaining about four fathoms in compass. When King James made a progress that way, a schoolmaster of the neighbourhood and all his scholars, dressed in oaken garlands, came out of this tree in great numbers, and entertained the king with an oration.

The *Nannau Oak* had been for ages an object of superstitious dread to the peasantry of Merionethshire. On the 13th of July, 1813, it fell suddenly to the ground. A drawing had fortunately been made by Sir R. C. Hoare, only a few hours before it fell, which has perpetuated its resemblance, and will long preserve the recollection connected with its history. It represents it as it then stood, pierced and hollowed by time, and blasted by strokes of lightning; and with its blanched and withered branches forming a contrast to the freshness and beauty of the surrounding scene.

In the neighbourhood it was known as the *Haunted Oak*, the *Spirit's Blasted Tree*, or, in Welsh, *Ceubren yr Ellyll*—the Hobgoblin's Hollow Tree. For these fearful names it is indebted to a circumstance well known in the history of that country.

Howel Sele, a Welsh chieftain, and lord of Nannau, was privately slain during a hunting quarrel, by his cousin, Owen Glyndwr, or Glendower, and hidden for a long time within its hollow trunk. The remembrance of this tragical event was afterwards preserved by tradition among the peasants, who would point out to the traveller the Haunted Oak; and as they passed it in the gloom of night, would quicken their pace, and perhaps murmur a prayer for personal protection, against the craft and assaults of the demon of the tree. It was twenty-eight feet in circumference.

Many other instances are recorded of the great age to which the oak attains.

Besides which, the famous *chestnut* trees of Mount Etna, called the *Castagnade Cento Cavalli*, one hundred and eighty feet in circumference at the bottom of the trunk, are undoubtedly of very great antiquity.

In the Garden of Olives, at Jerusalem, there are eight *olive* trees, which can be proved by historical documents to have been there previously to the conquest of that city by the Turks, and consequently they must be at least eight hundred years old.

Of the *yew* tree many authentic instances can be adduced. There is one especially in the neighbourhood of Staines (at Ankerwyke House), that was there previously to the meeting between King John and the Barons, who compelled him to sign Magna Charta A. D. 1215. Whilst those at Fountain's Abbey, in Yorkshire, are probably more than one thousand two hundred years old, and some are said to be two thousand five hundred and three thousand years old.

The *baobab* trees of Africa, and the deciduous *cypress* of Chapultepec in Mexico, are said to be of still higher antiquity, the first having been estimated by Adanson at five thousand one hundred and fifty years, and the other, De Candolle considers still older.

In the course of the inquiry into the method of computing the age of trees, a discovery has been made of some importance to timber growers, inasmuch as it shows that those who plant for profit alone, should not allow their trees to grow beyond a certain number of years, varying according to species; for it has been found, that so far are exogenous trees from continuing always to increase in diameter at the same rate, that every kind diminishes in its rate of growth after a certain age;—the oak, for example, between its fortieth and its sixtieth year, the elm after its fiftieth, the spruce fir after its fortieth, and the yew, probably, aftor its sixtieth. With reference to this subject, De Candolle has constructed a table of rate of growth, which we subjoin.

Table of the Rate of Increase in Diameter of certain Exogenous Trees, expressed in Lines.

Yrs.		Yrs.	Quercus pedunculata, 130 years old.	Quercus sessiliflora, 210 years old.	Quercus sessiliflora, 333 years old.	Larch fir, 255 years old.	Elm, 335 years old.	Spruce fir, 120 years old.	Yew, 71 years old.
1	to	10	54	10	18	48	16	41	8
10	..	20	62	16	33	61	44	54	11½
20	..	30	54	22½	39½	58	58½	52	12
30	..	40	60	12	38	72	72	45½	10½
40	..	50	48	13½	23	46	88	35	7
50	..	60	44	14	12½	57	74	36	12½
60	..	70	56	10⅜	9	46	78½	18	8
70	..	80	44	11	9½	29	66	17	
80	..	90	32	9½	8½	30	59	13	
90	..	100	32	9½	8	24	45	13	
100	..	110	30	9½	7½	32	30	22	
110	..	120	36	9	8½	26	30	22	
120	..	130	30	9	8	20½	24		
130	..	140		9½	10	22	24		
140	..	150		10	8	23	18		
150	..	160		8½	8½	21	19		
160	..	170		9	9	20	17½		
170	..	180		10	8	19	23		
180	..	190		9	8	18	30		
190	..	200		9	7	21	34		
200	..	210		9	8	22	34		
210	..	220			7	22½	26		
220	..	230			6	21	36		
230	..	240			8	22	28		
240	..	250			8	20½	26		
250	..	260			7½		24		
260	..	270			8		17½		
270	..	280			8		26		
280	..	290			8½		28		
290	..	300			8½		29		
300	..	310			9		16		
310	..	320			8		16½		
320	..	330			8		21		

The mode of increasing the *endogenous kinds*, when young, is in diameter rather than in length, until a certain magnitude is obtained, and then to shoot up a stem, the diameter of which is never materially altered.

It is more difficult to ascertain the age of endogenous trees (which comprise principally the palm tribe, and some other tropical trees), than of the exogenous; they present an appearance of so many wooden pillars, of which the outer parts are the older and harder—the inner are younger and softer.

The diameter, which trees of this sort ultimately attain, is is very nearly gained before it begins to lengthen, and, afterwards, all the new woody matter, which every successive leaf necessarily produces during its development, is insinuated into the centre; for the addition of new matter, to a trunk of this kind, is by longitudinal fibres in the inside near the centre.

This mode of growth would seem to preclude the possibility of such trees attaining to any very considerable age; for the woody matter, previously existing in the centre, being displaced, and constantly forced outward towards the circumference, and the outer rind or cylinder not accommodating itself by expansion, this part of the tree must, of necessity, become gradually harder. But when arrived at a certain measure of firmness, it will, in consequence, give way no longer. The central parts will then gradually solidify, as new matter is still introduced by the leaves of new wood, until, at length, the whole stem becoming equally hard, and no longer capable of giving way, as soon as this occurs, the tree ceases to exist; and although it has been conjectured that certain Brazilian cocoa-nut palms are from six to seven hundred years old, yet from the method of computing their age, which is either by the number of rings externally visible upon their rind, between the base and the summit of the stem, or by comparing the oldest specimens, the age of which is unknown, with young trees of a known age, it is apparent that it is not founded upon sound physiological consideration, but is entirely conjectural. Besides which, the Arabs do not assign to the date palm, which is the sort best known to Europeans, a greater longevity than from two to three centuries.

M. De Candolle observes, admitting that the outer rings of the stalk mark the years, we may reckon the proximate age of the palms of Brazil, after the elements furnished by the magnificent work of M. De Martius, as follows—

	Height of the trunk.	Diameter of the trunk.	Distance of the rings.	Probable age.
	Feet.	Inches.	Inches.	Years.
Œnocarpus Bataua . .	80	12	7	1
Euterpe oleracea	120	8 to 9	4 to 5	300
Euterpe edulis .	100	6 .. 7	4 .. 5	300
Iriartea exorhiza	80 to 100	12	4 .. 6	250 to 300
Gulielma speciosa	80 .. 90	6 .. 8	4 .. 5	250 .. 300
Cocos oleracea .	60 .. 80	12	1 .. 2	600 .. 700
Cocos nucifera .	60 .. 80	4 .. 12	3 .. 12	80 .. 330

ON EDGINGS.

The best and most durable plant for edgings in a garden is *Box;* which, if well planted, and rightly managed, will continue in beauty several years: the best season for planting this, is either in the autumn, or very early in the spring; for if you plant it late, and the season should prove hot and dry, it will be very subject to miscarry, unless great care be taken to supply it with water. The best sort for this purpose is the dwarf *Dutch Box.*

These edgings are only planted upon the sides of borders next walks, and not (as the fashion was some years ago) to plant the edgings of flower-beds, or the edges of fruit-borders in the middle of gardens, unless they have a gravel-walk between them; which renders it proper to preserve the walks clean, by keeping the earth of the borders from washing down into the walks in hard rains.

It was also the practice formerly to plant edgings of divers sorts of aromatic herbs, as *Thyme*, *Savory*, *Hyssop*, *Lavender*, *Rue*, &c. But as these very sorts grow woody, so that they cannot be kept in due compass, and in hard winters they are often killed in patches, whereby the edgings are rendered incomplete, they are now seldom used for this purpose.

Some people make edgings of *Daisies*, *Thrift*, *Catch-fly*, and other flowering plants; but these also require to be transplanted every year, in order to have them handsome; for they soon grow out of form, and are subject also to decay in patches; so that there is not any plant which so completely answers the design as *Dwarf Box*, which must be preferred to all others for this purpose.

THE LESSER OR MALABAR CARDAMOM.

Mr. White, who has given a most accurate and perfect history of this plant, speaks of its seeds as "one of the most valuable articles of modern luxury, regarded as a necessary of life, by most of the inhabitants of Asia—a grateful and salubrious necessary of diet—whose general adoption by the civilized nations of the other quarters of the world is prevented only by its limited importation."

This is certainly quite a new idea to us Europeans, who value this drug merely as a grateful and wholesome stomachic, on which account it becomes an article of commerce, having supplanted all its relatives in the apothecary's shop. Its general use in Asia, indeed, renders the plant a very important and profitable object of culture, though the harvest, occurring at the most unhealthy season, is not unattended by serious dangers. The profit of the Cardamon farms, however, is so as to overcome all difficulties.

In the evidence of T. H. Baber, Esq. given before the Lords Committee in 1830, we find a curious account of the manner in which these plants are produced (it cannot be said cultivated) in Malabar. In the recesses of the mountains, the trees being felled and afterwards burnt, wherever the ashes fall in the openings or fissures of the rocks, the cardamon-plant naturally springs up. In Soonda, Balagat, and other places where cardamons are made an object of cultivation, the seed is very inferior to that produced in the above manner. When cultivated, they are propagated by cuttings from the roots; in the third year the plants come to perfection, bear prolifically for a year or two and then die. In some parts of Malabar, however, the spontaneous growth is so abundant as to leave little necessity for cultivation. It was discovered by M. Sonnerat, growing so plentifully on one mountain, on one coast of Malabar, as to furnish sufficient supply for the demand of all India. The usual crop collected in Malabar is reckoned at about a hundred candies annually. (A candy is 600 lbs. avoirdupois.) The quality of the seeds varies very much, according to the locality of the plant: they are therefore usually distinguished by the places of their growth, and are esteemed accordingly. Many merchants, by looking at cardamoms, immediately know the part of the country whence the come.

The indications of good seed are—a difficulty of being broken, a plump appearance, a bright yellow colour, and a penetrating odour, with an acrid, and somewhat bitter, though not very unpleasant taste.

Before packing them for sale, great care should be taken that they are perfectly dry. It is considered that they are best preserved in a body. They are, therefore, usually packed in large chests, well jointed and pitched at the seams, and otherwise secured against the admission of any external moisture, as the least damp very much lessens their value.

This plant is a native of India, Cochin China, China and Ceylon. The best Cardamoms are brought from the Malabar coast. In Java the plant grows wild in the woods, but its produce is much inferior to the Cardamoms of Malabar.

AIR PLANTS.

Some plants are so called because they possess the peculiar property of living for a considerable period, if suspended in air without being in contact with any substance from which they can absorb food.

There are two different tribes to which the name of air-plants has been applied; the first containing the moss-like *Tillandria usneoides* which makes such a beautiful appearance in the hot damp forests of tropical America, where it is seen hanging in festoons from the branches of the trees; and the *T. xiphioides*, the fragrance of which induces the inhabitants of Buenos Ayres to adorn the balconies of their houses with it. This tribe is called by botanists *Bromeliaceæ*.

The other tribe, which is named *Orchideæ*, is the one to which the gardener has hitherto almost exclusively turned his attention. There are several species in this tribe, but the one to which the name of air-plant is most justly due, is that of the ærides, which contain several species.

Dr. Lindley remarks, "till within a few years, the cultivation of air-plants of the *Orchis* tribe was supposed to be attended with insuperable difficulties; and of the many hundreds of beautiful species that are found in foreign countries, scarcely any were known in Europe, except from drawings, bad descriptions, and imperfect dried specimens. The method of growing them was so entirely unknown, that no one ever expected to preserve a species beyond a few months after its importation. The application of physiological principles has, however, at length overcome all difficulties, to so great a degree, that *orchideous* air-plants have become comparatively common in the hothouses of the lovers of beautiful flowers; and there appears little reason to doubt that in a few years it will be as common to see them suspended in the drawing-rooms of the richer inhabitants of this country, as they have long been in the houses of the Chinese, a purpose for which the surpassing beauty and delicious fragrance of many render them particularly well adapted.

"The native country of these curious plants is, wherever a climate is found in which heat and moisture are in excess. Within the tropics in Asia, Africa, and America, in damp and shady forests, by the side of fountains, within reach of the spray of waterfalls, perched upon the branches of trees, or clinging to rocks and stones, by means of their long and withering roots—creeping among moss, rearing their flowers in the midst of brakes, and other moisture-loving tribes—in all such situations they are found in abundance. But in those regions where the heat is accompanied by periodical dryness, as the open plains of India, and the sandy deserts of Arabia and Africa, they are almost entirely unknown. The principal stations for them are the woods of Brazil and Peru, the lower mountains of Mexico, the West Indies, Madagascar, and the adjoining islands, the damp jungle of Nepaul, and the whole of the Indian Archipelago; in Java alone, nearly 300 species have been discovered. In that country they are described as overrunning the trees by thousands in mountain forests, choked up by huge climbers, and a rich undergrowth of gigantic grasses, while not a ray of sun-light can enter to dispel the damp and gloom.

"Such are the conditions under which air-plants of the kind now described naturally thrive; 1st. high temperature; 2nd. diffused light, like that of a shady grove, and not direct solar light; 3rd. a great degree of dampness; and 4th. a perfect freedom from stagnant water round their roots: for on the trunks of trees, or on stones and rocks, no water can lodge, and all the moisture they receive must necessarily be in the form of vapour or falling rain. And it is to circumstances of this nature that the gardener has chiefly to attend. Damps, shade, heat, and good drainage will be his objects; the three former will cause him no trouble, but the latter will require him to alter entirely his usual mode of cultivation. Instead of considering in what kind of soil his air-plants are to be placed, he will endeavour to dispense with soil, and to supply its place with bits of rotten wood, chopped moss in very small quantities, fragments of half-baked pottery, such as garden pots and the like. These are the points which enable modern gardeners to obtain a certain degree of success.

ON THE THEORY AND PRACTICE OF AGRICULTURE.

In an art so necessary to mankind, and one that has been so universally practised, it may perhaps be expected that the principles on which its operations depend, have by this time become completely and accurately investigated, and that, consequently, a correct theory may be exhibited. This, however, is by no means the case; and it is not a little singular, that in this most useful of all arts, the theory should be more defective than in almost any other with which we are at all acquainted. It is fortunate, however, for the human race, that in most cases, or at least in all important arts, they succeed better in practice than in speculation. Various reasons render it more difficult to form a complete theory of agriculture, than of chemistry, mechanics, or other arts. In agriculture, an experiment cannot be made in an instant, an hour, or a day. A whole season must pass away before a single experiment can be performed, and even then the inquirer may be misled (as in other arts) by some unobserved circumstance. Some fact, quite foreign to the experiment itself, arising out of the peculiar state of the soil, or of the train of seasons, may produce plentiful crops for a year or two, although in ordinary circumstances, no such effect would follow, and the ingenious contriver of the experiment, who thought he had made an important discovery, may afterwards derive from it only disappointment and mortification. Human life itself is too short for the same individual to perform any great variety of experiments in agriculture. After a few seasons he leaves his place to be occupied by a new inquirer, possessed of a different character and of different views. Until of late years, it was not usual for husbandmen to publish the results of their private experience. Scattered over the face of large countries and having little intercourse with foreigners, or even with each other, they knew but little as to what was done or doing by men engaged in the same profession even at no great distance. The benefit of local discoveries therefore was not communicated to the world at large, nor was an opportunity afforded to correct local prejudices and erroneous practices. But as the state of this important profession is now rapidly altering in these respects, there is little doubt that we are fast approaching towards a period at which it will be possible to exhibit a clear and correct theory of agriculture, or to arrange, under a few simple heads, the rules or principles upon which the practice of the art depends.

An attempt of this kind will naturally resolve itself into the two following investigations:—*first*, to inquire among the great variety of vegetables that exist in nature, what particular plants ought to be regarded as most worthy of cultivation; and *secondly*, to consider the best mode of cultivating with success the plants thus selected. With regard to the first of these divisions, namely, what vegetables ought to be chosen as most valuable and worthy of cultivation, it may be observed, that the value of a plant is of two kinds, *absolute* and *relative*. The *absolute* value of a plant depends upon its fitness to afford subsistence to the human species—its *relative* value consists in the tendency of its cultivation to enrich a particular husbandman, or class of husbandmen, either because their lands are well adapted for its growth, or because there is a ready market, and, consequently, a high price for it in the vicinity.

Concerning the absolute value of plants, or their tendency to afford subsistence to mankind, it is to be observed, that some plants are *directly* useful or valuable, because they are consumed by man in the way of food, such as wheat, oats, barley, potatoes, &c.; whereas, another class is only useful in an *indirect* manner, by giving them to cattle, and afterwards eating the flesh of those cattle, as is the case with grass and straw of all kinds.

Some vegetables afford us subsistence by means of the fruit that grows upon them, which hangs, and is brought to maturity in the air, at the summit of their stems. Others derive their value from their producing roots, which come to maturity in the bosom of the soil, and are dug from thence to be consumed by mankind. Of fruit-bearing vegetables, those called trees, which rise aloft with a stout trunk, are the most permanent and remarkable. A spot of ground occupied by some kinds of trees, such as chestnuts and dates, is capable of producing a very large portion of food for the support of man. One advantage in cultivating such trees would be, that after they had been planted and secured for a few years by fences, they would, for a number of years afterwards, continue to grow and flourish without any further care or labour. It does not, however, appear, in any nation, either ancient or modern, that forests of fruit-bearing trees have been reared with this view. For this, two reasons may be assigned. In the *first* place, a considerable number of years must elapse before they could arrive at maturity; and, *secondly*, because they would be destroyed in time of war. However useful, therefore, they might be to future ages, it is evident they could afford but little prospect of advantage to the generation which planted them.

Of annual plants cultivated for fruit, *Wheat* has always been accounted the most valuable. This has probably arisen from the great facility with which the flour of it undergoes a process of fermentation, which renders it capable of becoming a more light and agreeable kind of bread than the flour of any other grain. This quality is believed to arise from a quantity of a substance, contained in wheat, that is of the same nature with the gluten, or glue, that is prepared from animal bodies. It may not be improper to remark here, that, in modern times, an author of no mean reputation has arisen, who endeavours to prove that wheat ought not to be cultivated, nor bread to be eaten. This is M. Linguet, who has written a treatise expressly upon the subject; and, ridiculous as the assertion may seem, it has been thought worthy of a formal refutation by Dr. Tissot!!!

One of M. Linguet's arguments is, that wheat impoverishes the ground upon which it grows. Another objection is, the length of time required in the cultivation of wheat; but the most extraordinary argument, perhaps, ever thought of is, that the use of wheat, or bread made from it, is *detrimental to population*; and that the countries where this grain is cultivated, are poor and thinly inhabited, whereas those which abound in vineyards and pasture lands are rich and populous.

Dr. Tissot, in reply, argues that corn is more easily cultivated than grass; and that in districts which furnish fodder and fine crops of grain, the inhabitants are wealthy and happy, if not oppressed by taxes.

Notwithstanding its manifest utility as a necessary of life, and its importance to the farmer, as being the article from which rent in many districts is altogether paid, landed proprietors have, in numerous instances, attempted to interdict its culture; or at least, they have studiously endeavoured to lessen the quantity cultivated, by restrictions or penalties upon the grower, if a certain stipulated quantity was exceeded in any one year; and more particularly, if that quantity was exceeded in the latter years of a lease. Whether proprietors acting in this way were moved by wise and useful reasons, needs no inquiry; because it is evident, that the greater the value of the produce raised upon a farm, so much more rent is the farmer enabled to pay the proprietor; and though this increased rent may be delayed for a few years, namely, to the end of the current lease, the proprietor is sure to obtain it at that period. Proprietors, however, have hitherto thought differently, and their errors have been sanctioned by the courts of law, who have not been slow in punishing farmers, considered by them as deviators from the rules of good husbandry. Notwithstanding the impediments in the way, both legal and conventional, the culture of wheat has of late prodigiously increased, and now constitutes a prominent branch of British husbandry. Landed proprietors, it is believed, are now almost satisfied, that the growth of this grain does not deteriorate or waste their lands, though formerly not a few of them thought that the vegetative powers of their estates might be sold in the public markets in the shape of wheat—an idea handed down from father to son for successive generations, though now in some degree renounced and abandoned.

ON SOILS GENERALLY.

A LAND considered as the basis of vegetation is called soil. The particles of the various solid, as well as less compact bodies, that are met with in nature, and which have been rubbed down and reduced by the successive operations of the atmosphere, and the agency of other natural causes, being mixed and blended together in different ways and proportions, constitute the earthy compounds, which, from their being capable of absorbing, and in some measure retaining, moisture, as well as giving stability, afford the means of support to various products of the vegetable kind, and form the basis of soils in general; whilst the materials proceeding from the decomposition and decay of numerous organized animal and vegetable substances, uniting with such compounds, compose the superficial layers of rich mould, from which plants chiefly draw or derive their nourishment and support.

Soils, being formed in this manner, it is evident they must vary much, both in the qualities and proportions of the ingrediants of which they are composed. In one situation or district one sort of material is abundant, and consequently enters largely into the soil; in others it is deficient, while those of other kinds are plentiful, and constitute the principal parts of the soils where they are found. Some situations abound much more with animal and vegetable matters than others, which produce great diversity in regard to the soils. The harder and more firm substances of nature, being reduced more slowly, and with greater difficulty, into the state of earth, generally enter in much smaller proportion into the composition of soils, than those which are of a soft and more pliable disposition, and which approach nearer to the quality of earth. Thus, argillaceous, loamy, and vegetable matters are found to predominate very much in soils in their primitive state, and, according to their particular qualities and proportions, to constitute very material differences in their properties. Calcareous and silliceous earthy matters are distributed over some districts in great abundance, while in others they enter into the composition of the soils in much smaller proportions, and thus contribute to vary their textures and qualities.

One of the means of deciding in respect to soils, which, in many cases, when properly limited and exercised by a person of sound judgment and duly experienced, is certainly not a bad one, though in some respects also defective, is that of determining from the nature of the plants that are naturally produced, the degrees of their growth and luxuriance. Thus, where plants, that are only accustomed to grow in good or peculiar sorts of soils, are met with in their natural and flourishing states in other places, the soils may be concludedto be of this or that kind, according to the circumstances in which they are found, and decide, in the opinion of farmers, their agricultural value with more popular certainty than even chemical analysis.

The *saintfoin* is almost always an indication of *calcareous soil;* the *tussilago farfara* (common coltsfoot) of *blue clay;* the *arenaria rubra,* of *poor sand:* the *small wood sorrel* of the presence of *iron,* or of *peat.* The *arundo phragmites* (common reed grass), and the *polygonum amphibium* (common pond weed), grow on *alluvial soils,* which yield excellent crops if properly drained; but where the *equisetum arvense* (field horse-tail), grows freely, it is a sure indication of a *cold* and *retentive subsoil.* The *anagallis arvensis* (field pimpernell), *sherardia arvensis* (field madder), *lithospermum arvense* (corn gromwell), and the *fedia olitorea* (lamb's lettuce), grow in cultivated *black loamy* soil, on a dry bottom. Soil of this description, when wet, produces the *stachys palustris* (clown's all-heal). A *light sandy* soil is known by the presence of the *lamium purpureum* (red dead nettle); and the *thalspi bursa pastoris,* where the *aphanes arvensis* (parsley piert), is found, the soil is rather unproductive; if the *spergula arvensis* (corn spurry), grows very thick, the ground has likely been rendered too fine by the harrow; the *senecio jacobœa* (common ragwort), and the *serratula arvensis* (corn thistle), grow indiscriminately on *light* and *strong loams,* but always indicate a *fertile* soil. The *draba muralis* (whitlow grass), and the *sceleranthus annuus* (common knawell), grow on soils that are *dry, sandy,* and *poor* in the extreme. The *ononis hircina* (common rest harrow), is often found on dry pastures, and where the soil is *incumbent* on *rotten rock.* The *saline, aquatic* and *peaty* soils are almost everywhere indicated by their appropriate plants.

The growth of certain sorts of timber trees and hedges, may also in various instances serve to direct the judgment, and likewise the appearances or colours of the mould in particular instances; the smell and the touch will also help to inform us of the quality of a soil. The best emits a fresh pleasant scent, when fresh dug up; and if due proportions of clay and sand are intimately blended, it will not stick much to the fingers in handling.

With regard to soils being variable and indistinct, it is a difficult task to describe them, or to mark with any degree of accuracy, the shades which distinguish one from another, so nearly are many of them connected.

The amiable and indefatigable Mr. Loudon has ingeniously constructed a table, which enumerates the more common genera, species, and varieties of soils. The application of the terms will be understood by every cultivator, though to attempt to describe the soils, either chemically or empirically (as by sight, smell, or touch), would be an useless waste of time. From a very little experience in the field or garden, more may be gained in the study of soils, than from a volume of such descriptions. The table corresponds with the nomenclature adopted in the agricultural establishments on the Continent, and it is therefore very desirable that it should become as generally adopted as that of the Linnæan system in botany. The principle of the table may be extended so as to include any other soil whatever.

Mr. Loudon observes, "that in naming the species of soils, greater care is required to determine distinctions than in naming the genera; and there is also some difficulty in applying or devising proper terms. The species are always determined by the mixture of matters, and never by the colour or texture of that mixture which belongs to the nomenclature of varieties. Thus, a clayey soil with sand, is a sandy clay, this is the name of the species; if the mass is yellow, and it is thought worth while to notice that circumstance, then it is a yellow sandy clay, which expresses at once the genus, species, and variety. A soil containing equal parts of clay, lime, and sand, would, as a generic term, be called clay, lime, and sand; if it contained no other mixture in considerable quantity, the term entire, might be added as a specific distinction; and if notice were to be taken of its colour or degree of comminution, it might be termed a brown, a fine, a coarse, a stiff, or a free entire clay, lime, and sand."

Sir Humphrey Davy, however, in his *Elements of Agricultural Chemistry,* considers it as a vain labour, to attempt to class soils with scientific accuracy. He thinks, too, that the distinctions at present adopted by farmers are quite sufficient for the purposes of agriculture, especially if some degree of precision be had recourse to in the application of the terms. The term sandy, he thus conceives, should never be applied to any soil that does not contain at least seven-eighths of sand; sandy soils, that effervesce with acids, should be distinguished by the name of calcareous sandy soil, to distinguish them from those that are siliceous. The term clayey soil should not be made use of to any land which contains less than one-sixth of impalpable earthy matter, not considerably effervescing with acids: the word loam should be limited to soils containing at least one-third of impalpable earthy matter, copiously effervescing with acids. A soil to be considered as peaty, should contain at least one-half of vegetable earthy matter. And that, in cases when the earthy part of a soil obviously consists of the decomposed matter of one particular sort of rock—a name derived from the rock, may with propriety, it is supposed, be given to it. In this way, it is imagined, that if a fine red earth be found immediately above decomposing basalt, it may be denominated basaltic soil. If fragments of quartz and mica be found abundant in the materials of the soil, as is often the case, it may be called granitic soil, and the same thing may be done in a great number of other similar cases.

In general, the soils, the materials of which are the most various and heterogeneous, are those called alluvial, or which have been formed from the depositions of rivers; and these deposits may be designated as siliceous, calcareous, or argillaceous; and in some cases the term saline may be added as a specific distinction, applicable, for example, at the embouchure of rivers, where their alluvial remains are overflown by the sea.

A Condensed View of the Chemistry of Soils, as given by Sir H. Davy.—" In cases," says this writer, " where a barren soil is examined, with a view to its improvement, it ought in all cases, if possible, to be compared with an extremely fertile soil in the same neighbourhood, and in a similar situation; the difference given in their analyses would indicate the method of cultivation, and thus the plan of improvement would be founded upon accurate scientific principles.

" If the fertile soil contained a large quantity of sand, in proportion to the barren soil, the process of melioration would depend simply upon a supply of this substance, and the method would be equally simple with regard to soils deficient in clay or calcareous matter. In the application of clay, sand, loam, marl, or chalk to lands, there are no particular chemical principles to be observed; but, when quick-lime is used, great care must be taken that it is not obtained from the magnesian limestone, for in this case it is exceedingly injurious to land. The magnesian limestone may be distinguished from the common limestone by its greater hardness, and by the length of time that it requires for its solution in acids; and it may be analysed by the process for carbonate of lime and magnesia.

" When the analytical comparison indicates an excess of vegetable matter as the cause of sterility, it may be destroyed by much pulverization, and exposure to air, by pairing and burning, or the agency of lately made quicklime; and the defect of animal and vegetable matter must be supplied by animal or vegetable manure. The general indication of fertility and barrenness, as found by chemical experiments, must necessarily differ in different climates, and under different circumstances. The power of soils to absorb moisture, a principle essential to their productiveness, ought to be much greater in warm and dry countries, than in cold and moist ones; and the quantity of fine aluminous earth they contain, should be larger. Soils likewise that are situate on declivities, ought to be more absorbent than those in the same climate on plains or in valleys.

" The productiveness of soils must likewise be influenced by the nature of the subsoil, or the earthy or stony strata on which they rest; and this circumstance ought to be particularly attended to, in considering their chemical nature, and the system of improvement. Thus, a sandy soil may owe its fertility to the power of the subsoil to retain water; and an absorbent clayey soil may occasionally be prevented from being barren, in a moist climate, by the influence of a sub-stratum of sand or gravel. Those soils that are most productive of corn, contain always certain proportions of aluminous or calcareous earth, in a finely divided state, and a certain quantity of vegetable or animal matter.

" The quantity of calcareous earth is, however, very various, and in some cases exceedingly small. A very fertile corn soil from Ormiston, in East Lothian, afforded in one hundred parts, only eleven parts of mild calcareous earth; the finely divided clay amounted to forty parts. It lost nine in decomposed animal and vegetable matter, and four in water, and exhibited indications of a small quantity of phosphate of lime. This soil was of a very fine texture, and contained very few stones or vegetable fibres. It is not unlikely that its fertility was in some measure connected with the phosphate, for this substance is found in wheat, oats, and barley, and may be a part of their foods.

" A soil from the low lands of Somersetshire, celebrated for producing excellent crops of wheat and beans without manure, I found to consist of one-ninth of sand, chiefly siliceous, and eight-ninths of calcareous marl, tinged with iron, and containing about five parts in one hundred and ten of vegetable matter. I could not detect in it any phosphate or sulphate of lime, so that its fertility must have depended principally upon its power of attracting principles of vegetable nourishment from water and the atmosphere.

" Mr. Tillett, in some experiments made on the composition of soils at Paris, found that a soil composed of three-eighths of clay, two-eighths of river sand, and three-eighths of the parings of limestone, was very proper for wheat. In general, bulbous roots require a soil more sandy, and less absorbent than the grasses. A very good potato soil from Varsel, in Cornwall, afforded seven-eighths of siliceous sand, and its absorbent power was so small, that one hundred parts lost only two by drying at four hundred degrees, Fahrenheit. Plants and trees, the roots of which are fibrous and hard, and capable of penetrating deep into the earth, will vegetate to advantage in almost all common soils that are moderately dry, and do not contain a very great excess of vegetable matter.

" The soil taken from a field at Sheffield Place, in Sussex, remarkable for producing flourishing oaks, was found to consist of six parts of sand and one part of clay, and finely divided matter; and one hundred parts of the entire soil, submitted to analysis, produced water three, silex fifty-four, alumina twenty-eight, carbonate of lime three, oxide of iron five, decomposing vegetable matter four, loss three."

Quality of Soil evinced by Chemical Analysis.—The discovery of the qualities of soils by chemical analysis, is extremely difficult, and is seldom performed successfully by the cultivator. In selecting specimens, care should be taken to procure them from different situations. When the field is in one part calcareous, and in another siliceous, the portions should be separately submitted to the experiments. From two to four hundred grains is the proper quantity for a perfect analysis, which should be rolled in fair weather, and when perfectly dry, preserved in phials, closed with ground glass stoppers, till the period of examination. The soil best for culture, according to the analysis of Bergman, contains four parts of clay, three of sand, two of calcareous earth, and one of magnesia. Kirwain observes, that the fertility of the soil depends much upon its capacity for retaining water. The ingredients of the soil, however, do not always correspond to the nature of the climate; the quantity of rain that fertilizes a wet soil cannot be equally suited to a dry one. Silicia in the soil exists under the modification of sand—alumina under that of clay. Soils in which the sand preponderates, are called dry, retaining the least moisture; those in which clay preponderates, retaining the greatest portion, are called wet. Before either of them are capable of culture, the excess must be retrenched, or the defect supplied. Besides the above, properties of soil may be ascertained mechanically. Its specific gravity may be ascertained by introducing into a phial, known to contain a certain weight of water, equal portions of water and of soil; to do which, it is necessary to pour in the water first, till the vessel is half full, and then put in earth till it reaches the brim. The difference between the weight of soil and water will be the result. Thus, if a bottle which holds four hundred grains of water, gains two hundred grains when half filled with water, and half with soil, the specific gravity of the soil is two, that is, it will be twice as heavy as water. Clay in any soil, may be known by its tenacity; sand by its roughness. Calcareous matter in soil, is known by its effervescing freely upon meeting with an acid. The presence of organized matter in soil may be ascertained by weighing it when it is perfectly dry; and after having subjected it to a red heat, weighing it again, which will give the proportion of organic matter. Metallic oxydes in soil may in general be known by their colour. Ferruginous soils are red and yellow; cupreous soils are interspersed with greenish streaks; salt, coals, sulphur, &c., may be known by the appearance of the water in such soils, and also by the peculiarity of vegetation.

But, however, that our readers may be informed of some of the leading principles which chemistry employs, in analysing soils, we give them the following, which may be depended on.

1. *To ascertain the quantity of water in any soil.*—Take a pound of the soil, spread it very thin before the fire, or in the sun-shine in a warm day, let it lie till it is thoroughly dry: the evaporation of the water will be known by the weight lost.

2. *To know if there are any metallic or earthy salts.*—Take a pound of soil, pour upon it a pound of boiling distilled water, stir them thoroughly together, and let them stand for ten minutes, filter off the water through filtering paper, pour into what comes through, a solution of the fixed vegetable alkali; if there is any earthy or metallic salt, a precipitation will take place.

3. *To know if the salt contained has calcareous earths for one of its elements.*—Take the filtrated solution, pour into it half an ounce of caustic volatile alkali, or continue to drop in this alkali till no further precipitation takes place; afterwards filtrate it, and pour to what filtrates a little solution of fixed vegetable alkali; if there is any further precipitation, it shows that there is an earthy salt consisting of calcareous earth for one of its elements; if a precipitation took place upon the application of the caustic volatile alkali, it shows that there certainly are earthy or metallic salts.

4. *To know if the salt contained is metallic or aluminous.*—Add to the filtrated solution an infusion of gall; if there is any metallic or aluminous salt, a precipitation will take place; if iron, a purplish black; if copper or alum, a gray; copper may also be distinguished from iron by falling in a blue precipitate upon the application of an alkali, while iron forms a greenish, and alum a white one.

5. *To know if magnesia is an element of the salts found.*—Take the filtrated solution, apply to it a solution of galls; if no precipitation takes place, apply caustic volatile alkali, which will precipitate the magnesia if it is an element of the salts contained.

6. *To know if a neutral salt is contained.*—Evaporate the filtrated solution with a boiling heat, till the whole water is nearly gone off, and let it stand to cool; if there is any neutral salt, it will crystallize.

7. *To know if there is any mucilage, and what quantity.*—Take thirty or forty pounds of the soil, boil it in ten gallons of water for an hour, let the earth subside, pour off the clean solution, afterwards add four or five gallons of water to the earth, stir them thoroughly, let them stand to subside, pour off the water clear, mix it with the former, and evaporate the whole to dryness, putting it into a water-bath towards the end of the evaporation; what remains is the mucilage, making allowance for that part of the decoction which was not washed out from the earth, and deducting the same substances, which will crystallize if there is a considerable quantity, but will be destroyed in the operation, if in small proportion, as they generally are.

8. *To know if there is any calcareous earth in the soil, and what quantity.*—Take two ounces and a quarter of the dry soil, apply to it half an ounce of muriatic acid, and four ounces of water in a glass vessel sufficiently large; let them stand together till no more effervescence takes place; and if it was very considerable, pour in half an ounce more of the acid, let this stand also till the effervescence ceases, if any arises upon pouring it in, continue to add more acid in the same manner, until what was poured in last produces little effervescence, which is often at the first, and generally at the second or third half ounce. After the effervescence has ceased, put the whole in a filter, let the solution filtrate through; pour half a pint of water upon what remains in the filter, let that filtrate also in the same vessel; add to the solution thus filtrated one ounce and a half of caustic volatile alkali for every ounce of acid used; if any precipitation takes place there is magnesia, earth of alum, or the calx of a metal (generally iron or copper) contained in the soil; after adding the volatile alkali, the whole is to be thrown into a filter again; after the filtration has taken place, pour into the liquor a solution of mild fixed vegetable alkali in water; if there is any calcareous earth in the soil, a precipitation will take place; continue to add the solution of the alkali till no fresh precipitation ensues, throw the whole into a filter, let the liquor filtrate off, pour on by degrees a pint of water, let that filtrate off also, dry what remains in the filter, it is the calcareous earth.

9. *To know the proportion of sand and clay.*—Take what remains in the filter after the first solution in the foregoing operation, and by the elutriation separate the sand from the clay, dry and weigh them; if there is any pyrites it will be in the sand.

In the above processes, the principal things to be attended to are, whether there are any metallic or aluminous salts, as these are absolute poisons, and therefore are to be decomposed by quick lime; whether there is such a proportion of neutral or earthy as to be hurtful, in which case the solution in process 2, will taste salt, a soil containing them in so large a proportion will hardly ever admit of culture for grain; whether there is calcareous earth, and in what proportion, as that ascertains the propriety of applying any manure containing it, and the quantity of that manure; what the proportion of sand and clay is which ascertains the propriety of adding clay or sand; whether there are pyrites, as that shows why and when, a soil will be long in being brought into cultivation; pyrites are best destroyed by fallowing, and afterwards applying lime.

From the great difference of the causes that influence the productiveness of lands, it is obvious that, in the present state of science, no certain system can be devised for their improvement, independent of experiment; but there are few cases in which the labour of analytical trials will not be amply repaid by the certainty with which they denote the best methods of melioration; and this will particularly happen when the defect of composition is found in the proportions of the primitive earth. In supplying animal or vegetable manure, a temporary food only is provided for plants, which is in all cases exhausted by means of a certain number of crops; but when a soil is rendered of the best possible constitution and texture, with regard to its earthy parts, its fertility may be considered as permanently established. It becomes capable of attracting a very large portion of vegetable nourishment from the atmosphere, and of producing its crops with comparatively little labour and expense.

The soils of this country have been described under numerous heads, and distinguished by a variety of vague local terms. They seem, however, to be capable of being considered and characterised, as far at least as is necessary for practical purposes, under the distinctions of *clayey, loamy, calcareous, sandy, gravelly, peaty,* or *mossy,* and *vegetable earth soils.*

Each of these divisions must of course comprehend several varieties, according to the nature and preponderancy of the different materials of which they are constituted or composed. By different combinations of these substances, all the intermediate kinds of soils are formed; and upon a proper mixture of them, in certain proportions, depends the success of the farmer's industry. *Sand, clay,* and *water,* are the grand component parts, whatever colour or texture the soil may happen to have.

Clayey or argillaceous soils.—Soils of this kind differ very materially, according to the nature and quantity of the clay that enters into their compositions, and the adulterations which has been produced in it by the intermixture of different earthy matters, as well as various mineral, vegetable, and animal substances. For clays are, in general, far from being pure in the state in which they are found in the earth. They are in many instances united with large proportions of siliceous or sandy matter. On these accounts it is that the clayey soils of some districts are so abundantly fruitful and productive, while those of others are insuperably sterile and refractory.

These facts not only show that there is a prodigious variety in respect to the qualities of these substances, but that they must afford equal variety to the soils into which they enter, and therefore require to be more closely examined and more nicely ascertained than they appear yet to have been, before all the varieties of soil usually classed under the denomination of clayey, can be well ascertained and understood.

But these substances do not differ only in their properties and qualities, but likewise in their colours, and the closeness with which these particles are united. They are found in their natural states of various colours, such as red, white, blue, and yellow, and of different degrees of density, so as, in some instances, readily to admit of being united with the different materials that are applied, in order to meliorate their conditions; in others they can scarcely be made to join with them by any means in the power of the agriculturist. In soils of the first kind the quantity of siliceous or sandy matter, in general, bears a much larger proportion to that of the argillaceous or clayey, than in those of the latter, and in many cases too the mixture of other substances is proportionably larger. The nature of the clayey stratum, in respect to its thickness or thinness, as well as its contiguity, or remoteness from springs of water underneath it, is too commonly overlooked in considering these sorts of soils; but all these circumstances demand particular attention, and ought to have considerable influence in directing the means of cultivating and improving clayey soils.

It is obvious, from what has been already advanced, that, notwithstanding the differences that take place from the accidental mixture of different materials, in different degrees and proportions, all the descriptions of this sort of soils must possess more or less of the heavy and adhesive stiff qualities; and that according as these are more or less predominant (due respect being at the same time had to the various other circumstances that have been stated), the business of cultivation and improvement must be varied and applied.

(*To be continued.*)

DESCRIPTION OF THE PLATES.

SAXIFRAGA ROTUNDIFOLIA.

ROUND-LEAVED SAXIFRAGE.

Decandria Digynia.

Saxifrageæ.

Gen. Char.—Calyx five-parted; petals 5; capsules two-beaked, one-celled, many-seeded.

Spec. Char.—Cauline leaves reniform, toothed, stalked; stem panicled.

Lower leaves almost round, resembling those of *golden Saxifrage;* on long footstalks, deeply divided, hairy and green above, pale beneath. Stems erect, about a foot high, channelled and hairy, with kidney-shaped leaves. The stem puts out a few slender footstalks from the upper part, which, together with the stem itself, are terminated by small clusters of flowers, white, spotted with red. Seeds ovate, up to eighty in a cell.

Of this numerous and beautiful genus, we know of none, whose flowers, in point of prettiness, can vie with those of the present species; they are marked with numerous small dots, like that of *umbrosa*, but in a superior style of beauty, and appear to great advantage when viewed with a magnifier.

This species succeeds best in a situation somewhat moist and shady, with a soil inclined to stiffness. Flowers in May and June, and is increased by parting its roots in autumn.

OENOTHERA LONGIFOLIA.

LONG-FLOWERED OENOTHERA.

Octandria Monogynia.

Onagrariæ.

Gen. Char.—Calyx four-fid; petals 4; capsules cylindrical, inferior; seeds naked.

Spec. Char.—Leaves toothletted; stem simple, pilose; petals distant, two-lobed.

We have seen this plant grow to a greater height than any other species, luxuriant specimens having exceeded five feet by the time that they have nearly done flowering; and as the flowers are uncommonly large and shewy, and continue blowing a long while in succession (from July to October), we scarcely know a more desirable plant for the open border of a garden that is spacious; the flowers indeed, as in most of the plants of this genus, open in the evening, and appear in their greatest beauty when those of other plants have either fallen to the ground, withered by the heat of the day, or folded in the arms of sleep.

It is an annual of ready growth, and very productive of seed, some of which ripen early; these are to be sown in the open border, where the plant is intended to flower, in March or the beginning of April; as a single plant will be sufficient for one spot, one seedling only need be left; care must be taken to put a stick to it early, of about four feet in length, to which its branches must be carefully tied, when about a foot long, and this is all that is necessary to be done; by this means the plant is not only preserved from the effects of violent winds, but appears to much greater advantage.

XERANTHEMUM FULGIDUM.

GREAT YELLOW-FLOWERED XERANTHEMUM.

Syngenesia Polygamia Superflua.

Compositæ.

Gen. Char.—Receptacle paleaceous; pappus setaceous; calyx imbricate, rayed; ray coloured.

Spec. Char.—Stem erect; leaves oblong; margin tomentose.

It is distinguished by the remarkable uprightness of its growth, and the unusual size of its flowers, which exceed those of any other known species of *xeranthemum* in our collections; they are of a fine yellow or gold colour, very glossy, and make a grand appearance either in the greenhouse when growing, or among similar plants on the mantle-shelf when dry.

Is propagated by cuttings; care must be taken that it does not suffer from too much moisture.

KALMIA AUGUSTIFOLIA.

NARROW-LEAVED KALMIA.

Decandria Monogynia.

Rhodoraceæ.

Gen. Char.—Calyx five-parted; corolla hypocrateriform, with a limb having two horns beneath; capsule five-celled.

Spec. Char.—Leaves lanceolate; corymbs axillary; bracteas linear, lanceolate; peduncles and calyx downy, with glands.

It is a low shrub, rarely rising above the height of two to six feet, dividing into small woody branches, which are very close, and covered with a dark gray bark. Leaves stiff, about two inches long, and half an inch broad, of a lucid green, placed without order upon the branches, on slender footstalks. Flowers in loose bunches on the sides of the branches, upon slender peduncles; they are bright red, when they first open, but afterwards fade to a blush or peach-bloom colour. Capsule roundish, compressed, crowned by the style, and filled with small roundish seeds. It grows spontaneously in swampy ground, and flowers with us from May to July; there are two principal varieties of it, one with pale and another with deep red flowers; these two plants differ also in their habits, the red one, the most humble of the two, not only produces the most brilliant flowers, but those in greater abundance than the other. Mr. Whiteley, who has these plants in great perfection, assures us that it usually blows in the autumn as well as summer.

This shrub is extremely hardy, thriving best in bog earth, and is propagated most commonly by layers.

Like the *latifolia*, it is regarded in America as poisonous to sheep.

CELSIA URTICÆFOLIA.

NETTLE-LEAVED CELSIA.

Didynamia Angiospermia.

Solaneæ.

Gen. Char.—Calyx five-parted; corolla rotate; filaments bearded; capsule two-celled.

Spec. Char.—Leaves ovate-lanceolate, serrate.

The extreme brilliancy of its flowers renders it a very ornamental plant; being of quick and ready growth, it is common in our green-houses, and on the borders of our flower gardens also; for it proves much more hardy than the *Celsia linearis*; it is a much stronger plant also, and in the open ground will grow to the height of several feet.

It flowers and seeds during most of the summer; is readily raised from cuttings, as well as from seeds.

HYDRANGEA ARBORESCENS.

SHRUBBY HYDRANGEA.

Decandria Digynia.

Saxifrageæ.

Gen. Char.—Capsule two-celled, two-beaked, opening by a hole between the beaks.

Spec. Char.—Stem arboreous; leaves ovate, smooth, alternate; stamens longer.

As a shrub commonly cultivated for ornament in our gardens and plantations, the *Hydrangea arborescens* has a right to appear in this work; nevertheless it is more with a view to illustrate a peculiar character of the genus, that it is here figured.

This shrub is a native of Virginia, and was introduced in 1736, by P. Collinson, Esq: it is of low growth, rarely exceeding four feet in height. Its flowers are produced on the summits of the branches, somewhat in the manner of the *Laurustinus*; they are small, crowded, nearly white, with a tinge of red in them which is not very brilliant, and some fragrance; they are produced in July and August, and sometimes followed by ripe seeds here.

Is easily propagated by parting its roots, the latter end of October; prefers a moist soil, but will grow in a dry one. If in severe frosts the stalks, which are rather soft, should be killed, new ones will be put up the following spring.

TRITILLARIA IMPERIALIS.

CROWN IMPERIAL.

Hexandria Monogynia.

Liliaceæ.

Gen. Char.—Sepals 6, with a honey pore above the claws.

Spec. Char.—Flowers in a raceme, with a coma over them, but naked below; leaves quite entire.

The Crown Imperial, a native of the East, most probably of Persia, was introduced, according to Dodonæus, into the gardens of the emperor and some of the nobility, at Vienna, in 1576; it appears to have been cultivated here as early as 1596; both Gerard and Parkinson describe it minutely, the latter on account of its "stately beautifulness, gives it the first place in his garden of delight."

It flowers usually in the beginning of April; the whole plant sends forth a strong unpleasant smell, compared by most writers to that of a fox, perceptible when you approach it; to this effluvia Parkinson endeavours to reconcile us, by saying that it is not unwholesome; it is so disagreeable, however, that few choose to have many of these plants, or those in the most frequented parts of their gardens, yet it ought not to be proscribed, for independent of the beauty and splendour of the magnificent pendulous flowers, there is much in it to admire, and especially its singular nectaria, which in the form of a white glandular excavation decorate the base of each petal. In these usually stands a drop of clear nectareous juice; the peduncle or flowerstalk, which bends downwards when the plant is in flower, becomes upright as the seed ripens.

Of this plant, as of all others which have long been objects of culture, there are many varieties; those most generally cultivated in our gardens, are the common orange-flowered single and double, yellow single and double, gold-striped leaved, and silver-striped leaved; the Dutch in their catalogues enumerate thirteen varieties.

Luxuriant plants will sometimes produce a second and even a third whorl or crown of flowers, and the flat-stalked ones, which are monsters, have been known to produce seventy-two blossoms, but none of these are found to be constant.

The Crown Imperial, though a native of a much warmer climate than ours, is a hardy bulb, and not very nice in regard to soil; succeeds best in such as are stiffish, enriched with manure, and placed in a sheltered situation.

Is propagated by offsets, which are produced in tolerable abundance.

COLUTEA ARBORESCENS.

TREE COLUTEA, OR BLADDER SENNA.

Diadelphia Decandria.

Leguminosæ.

Gen. Char.—Calyx five-fid; legume inflated, dehiscent.

Spec. Char.—Vexillum with two callosities, unfurled, larger than the blunt carina.

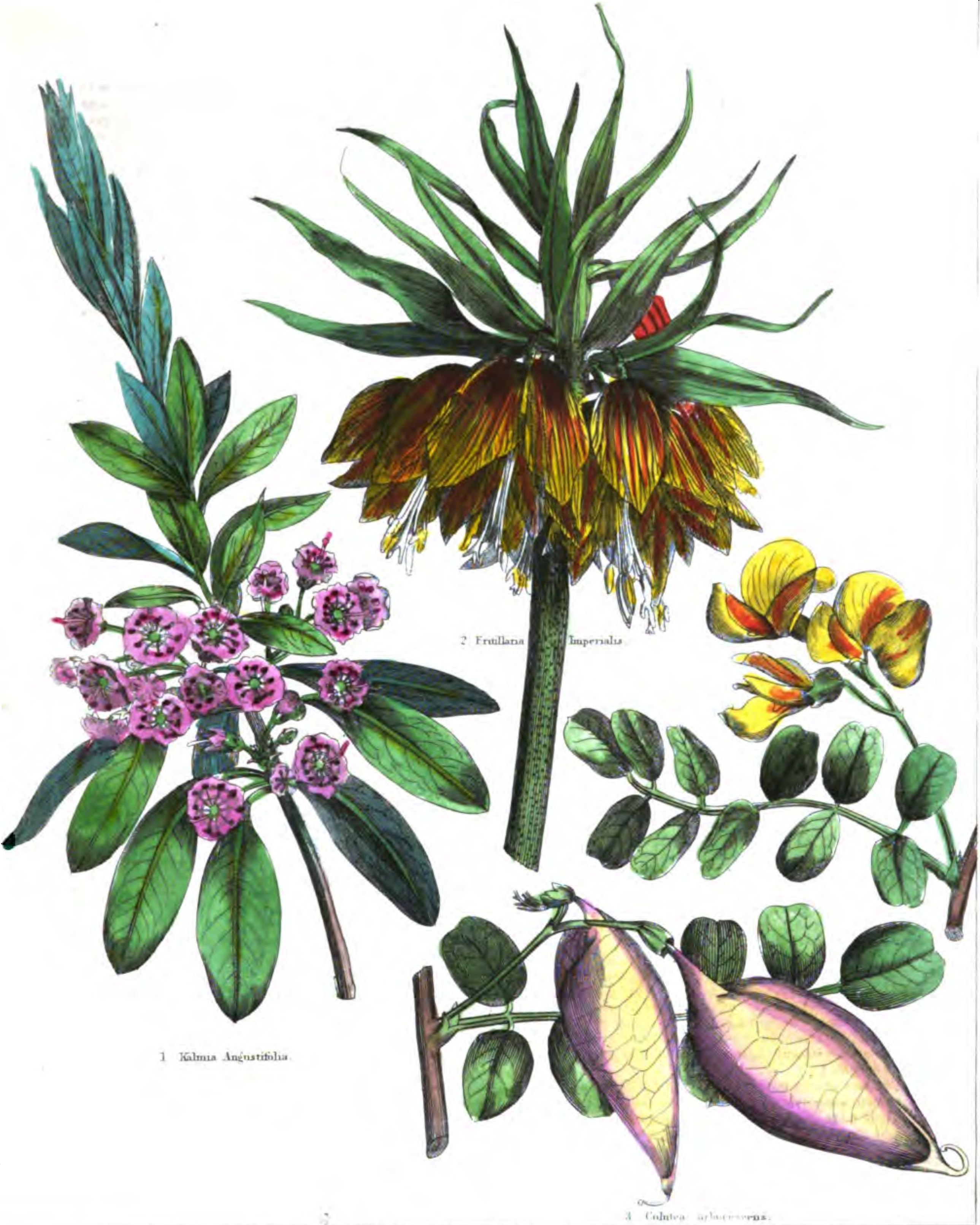
This has several woody stems, which grow to the height of twelve or fourteen feet, sending out many woody branches, with winged leaves, composed of four or five pairs of oval lobes, placed opposite, terminated by an odd one; these are indented at the top in form of an heart, and are of a grayish colour. The flowers come out from the wings of the leaves upon slender peduncles about two inches long, each sustaining two or three yellow flowers, whose standard is reflexed and large, with a dark-coloured mark upon it. Legume membranous, subtransparent, semi-ovate, inflated, ending at bottom in a longish peduncle, at top in a short point. Seeds as far as twenty, or even more.

The Bladder Senna, a native of the South of France and Italy, produces a profusion of bloom from June to August, when its inflated pods please from the singularity of their appearance; on these accounts, it is one of the most common flowering shrubs cultivated in gardens and plantations.

"It is propagated by sowing its seeds any time in the spring in a bed of common earth; and when the plants have come up, they must be kept clear from weeds, and the Michaelmas following they should be transplanted either into nursery-rows, or in the places where they are designed to remain; for if they are let grow in the seed-bed too long, they are very subject to have tap roots, which render them unfit for transplanting; nor should these trees be suffered to remain too long in the nursery before they are transplanted, for the same reason."—*Miller's Gard. Dict.*

We have learned by experience, that a very wet soil will prove fatal to these shrubs.

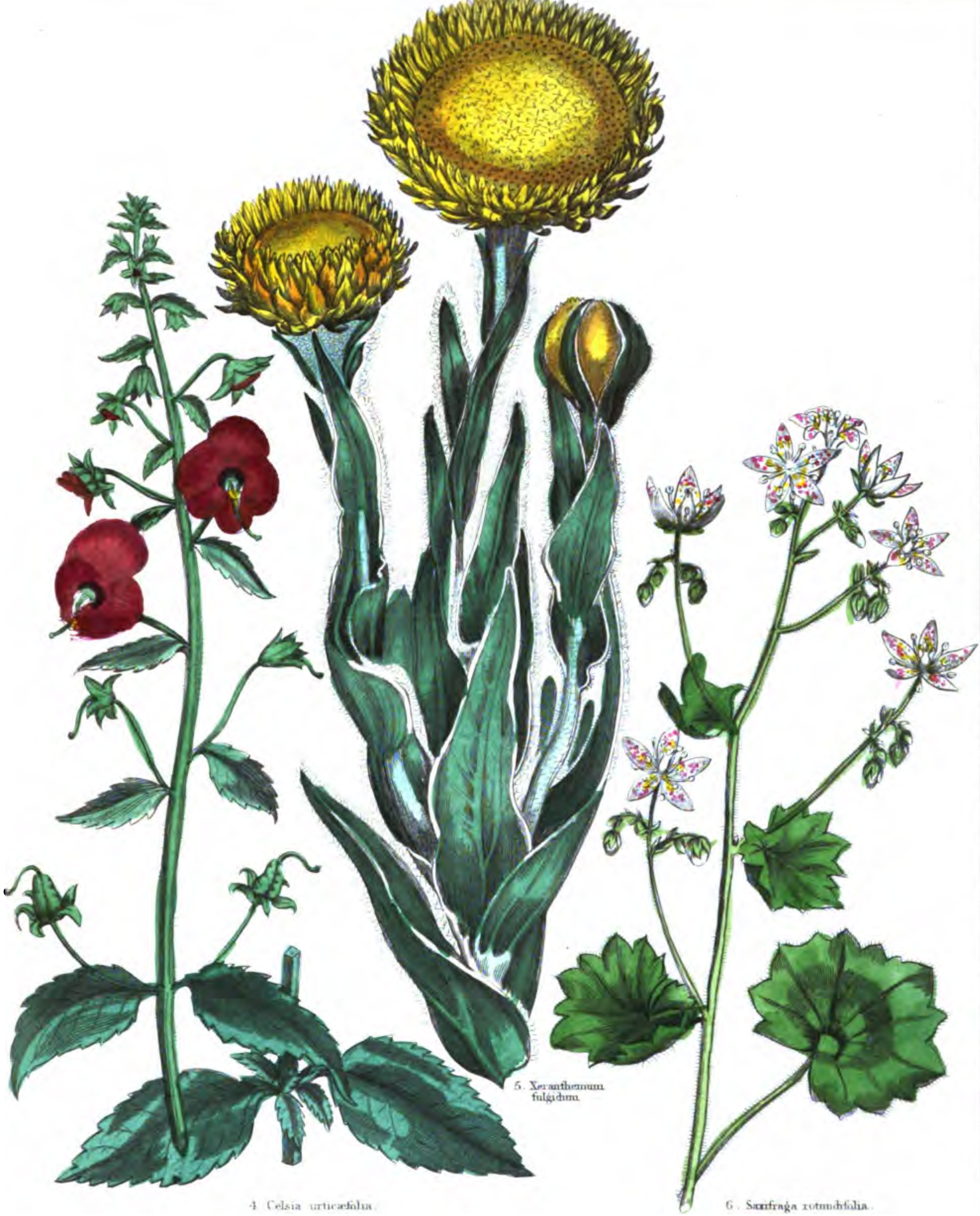
—o—



1 Kalmia Angustifolia.

2 Fritillaria Imperialis.

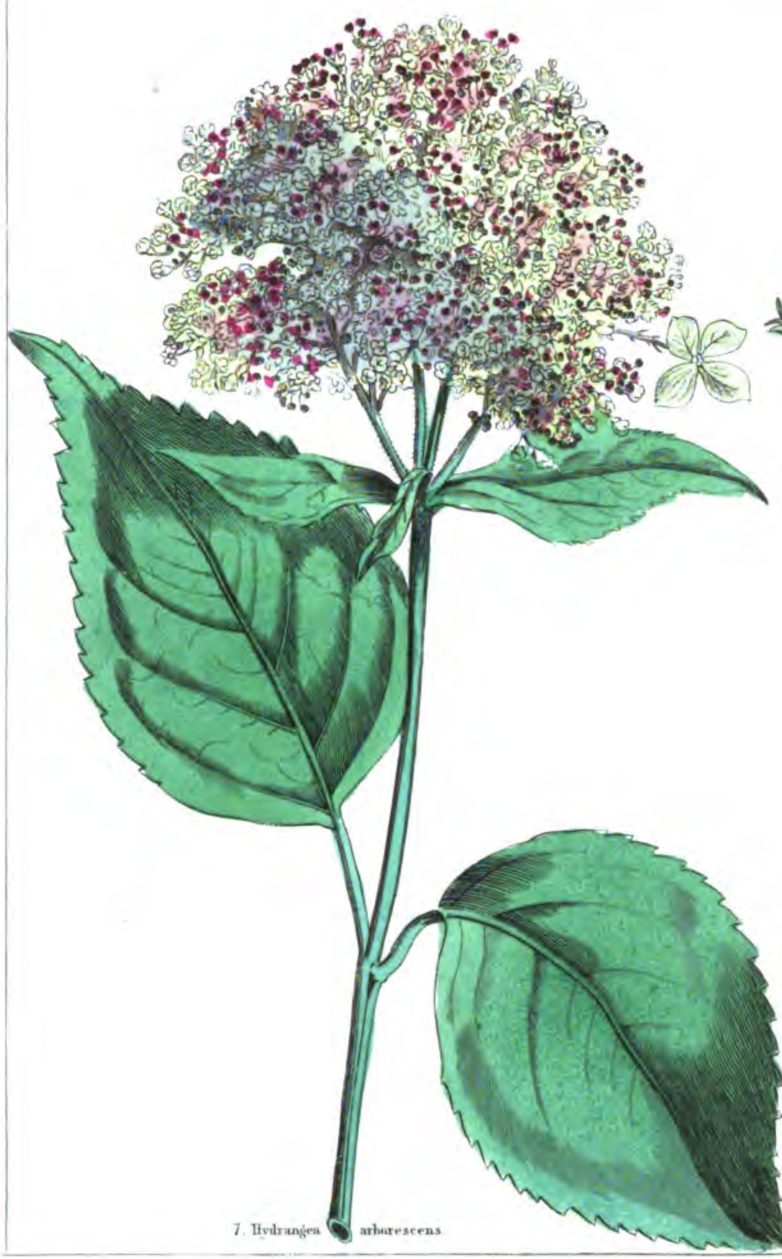
3 Colutea arborescens.



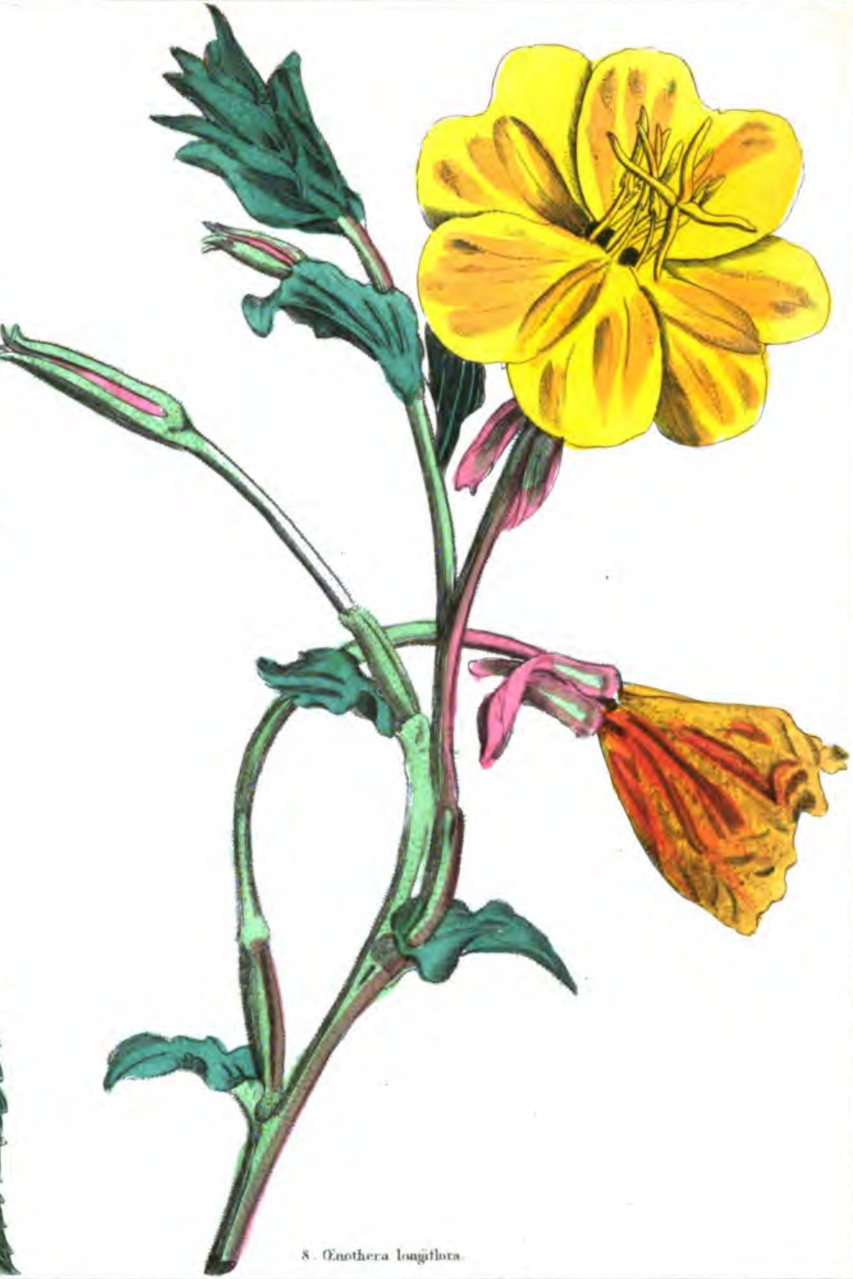
4. Celsia urticæfolia.

5. Xeranthemum fulgidum.

6. Saxifraga rotundifolia.



7. Hydrangea arborescens



8. Œnothera longiflora

THE
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AND
AGRICULTURE,
BRITISH AND FOREIGN.

DECEMBER, 1836.

ON SOILS GENERALLY.

Concluded from p. 175).

Loamy Soils.—Loamy denotes any soil which is moderately cohesive; that is, less so than clay, and more so than loose chalk. Soils, therefore, of this description, admit of considerable variety. The substances that are most commonly found to contribute to the formation of loamy soils, are clay, sand, gravel, and chalk; and as either ingredient predominates, so is the soil denominated as clayey loam, sandy loam, &c. Clayey loam is moderately cohesive, in which the argillaceous ingredient predominates; so that its coherence is greater than that of any other loam, but less than that of pure clay. Besides the argil, silex enters largely into the composition. Sometimes an oxide or calx of iron in small proportion is found blended with the clay and sand. In proportion as the argillaceous or clayey principle diminishes, they recede from the nature of the clayey soils; consequently, the nearer the quantity of that substance approaches to that of the others, the stronger and more heavy will the loamy soil be. The differences in the lightness and friability of the soils of this class in a great measure depend on the relative proportions of the other ingredients. Where the calcareous ingredient greatly exceeds those of the sandy or gravelly kinds, they are neither so light nor so pulverizable as where they are nearly equal, or where the sandy or gravelly matters considerably predominate over it.

In situations where this sort of soil has been but little disturbed, and consequently little changed by the artificial additions of either animal or vegetable substances, and those which it naturally contained not having advanced to the stage of perfect solution and decay, it is generally found of a light brown or hazel colour; but where much culture has been employed for a length of time, and large applications of animal and vegetable matters frequently made, the natural and artificial materials of these kinds having proceeded more nearly to the state of perfect resolution and destruction, it has an appearance that approaches to black. From these various circumstances the properties of the soils are likewise considerably altered and affected, as well as their colours changed.

From the soils of the loamy class being more friable and brittle, as well as more dry, than most of the clayey ones, they are capable of being tilled with much greater ease and facility, as well as much less strength of team, and at almost every season of the year; and, on account of their property of receiving and transmitting moisture more freely, they are less apt to be indurated by too much dry, or chilled by too much wet weather. Besides, they are more influenced on exposure to the agency of the atmosphere and other external causes, and thereby more adapted for the promotion and support of vegetation. And as they are found in most cases to be less disposed to the production of weeds, particularly those of the more injurious kinds, they can of course be kept clean with less labour, and without the expensive system of management which is requisite on many other kinds of soil.

Chalky or Calcareous Soils.—Soils of the calcareous kind, which are composed of clay, sand, and chalk, occupy very extensive tracts of land in different parts of the kingdom, and are marked with considerable diversity, as proceeding from the nature, properties, and proportions of the calcareous matter as it exists in them, the substances that are mixed and combined with the land, the depth and qualities of the earthy stratum which is placed upon it, and the disposition of the subsoil or basis on which this is formed and deposited.

Calcareous matter is contained in many different stony substances, besides that of chalk, as marble, limestone, coral, and shells of different kinds; and in states of union with other materials, such as sand, the different simple earthy bodies, in different proportions, and in some instances with iron and magnesia. Its capability or powers of imbibing and retaining moisture is considerable, though not so great as that of clay. It burns to lime by proper degrees of heat, and absorbs carbonic acid gas or fixed air in different proportions, from the atmosphere, and returns again to the state of chalk or mild calcareous matter. It is found of very different degrees of hardness and friability, as well as of different states of fineness or pulverization, in different soils of the class to which it belongs. It varies also greatly in its effects in respect to vegetation, from the different matters that may happen to be combined with it in its primitive or original state. It has long been known to the practical agriculturist, that some sorts of lime may be employed in large proportions, while others cannot be used, except in very small quantities, without doing very considerable injury to the soil with which they are incorporated.

Calcareous matter, whether it is in the state of carbonate, or in the more active one of causticity, as quick lime, seems ultimately to promote the resolution and destruction of vegetable and animal substances; in the latter state, however, it acts with much greater violence on these materials, destroying their organization, and dissipating their principles more quickly, as well as robbing them more completely of the carbonic acid gas, or fixed air, which is so essential, while, in the former, it operates with great mildness, and only aids the resolution of those substances by gently promoting the process of putrefaction.

The proportions of clayey, loamy, and gravelly ingredients, which are conjoined with the calcareous matters of these soils, are various in different districts; where the argillaceous and loamy materials are comparatively in large quantities, soils of the heavier chalky kinds are formed, and where the sandy or gravelly are predominant, we have the lighter ones. There are also material differences proceeding from the earthy matter with which the calcareous ingredient is mixed in the state of soil. Where the quantity of this is small, and not reduced into any perfect state of mould, the soil, as is evident, must be poor and thin; but where the depth of this superficial stratum is considerable, and the animal, vegetable, and other substances, of which it is composed, is advanced to a more complete state of decomposition and decay, the soils are more rich and heavy. Some variety is likewise caused by the state of the under-stratum or subsoil. If it is compact, and much intermixed with silicious or flinty matter, or have a mortary hardness, it is less favourable than where it is of a more open, brittle, or powdery texture.

Whatever appearances of lightness there may be in chalky soils, they require considerable strength in the team, where the staple or earthy stratum of the lands will admit of their being wrought to a tolerable depth ; but where there is a thinner surface of earthy materials, less draught will be requisite. In the latter cases, the soil is, however, far more precarious and uncertain, as well as much less productive in respect to the crops that are cultivated upon it, than in the former. As chalky soils are not so liable to be injured by water as others, the business of tillage is much less impeded from that cause; but a dry season sometimes renders them so hard as to be totally incapable of being broken up, until they have been moistened by the falling of a considerable quantity of rain.

Sandy or Silicious Soils.—Sands seem to have been gradually formed by the attrition and rubbing down of the various solid substances that are found in nature, especially such as are of the silicious, calcareous, and stony kinds, and are of different degrees of fineness as they approach the size of gravel. They are also met with of various colours and appearances, in different regions or tracts of country, such as white, dusky brown, yellow, and red. These differences, as well as those which respect their weight, tenacity, and other properties, depend on the nature and proportions in which many other materials enter into combination with them.

Where the proportions of clayey, loamy, or other earthy substances with which they are mixed, approach nearly to that of the sand, the heavier sorts of sandy soils are formed; but where these enter only in very small quantities, we have the light sandy soils; and where they are hardly met with at all, the soil is a loose blowing sand, most commonly of a white or brownish appearance. The portions of vegetable matter that are intermixed with different soils of the sandy kind are not less various than those of the clayey and loamy, from which considerable differences of quality are produced. These differences in their textures and compositions also introduce others which respect their powers of admitting and retaining heat and moisture. The openness and want of adherence in such soils, while they allow of the admission of heat and water more readily, permit them to be carried off with greater ease and expedition ; they are therefore less permanently benefited by their influence than the closer and more adhesive soils.

The light, open, and porous texture of sandy soils renders them much more easily cultivated and kept in order than those of the strong and close kinds; consequently the farms where they prevail are generally large ; and when properly prepared, they are better adapted for the growth of many sorts of crops, such as those of the bulbous and tap-rooted sorts. They have also another advantage, which is that of pushing forward the crops with more expedition. Whatever inconveniences attend them, they are mostly such as proceed from the want of a sufficient degree of cohesion among their constituent particles, and solidity of texture. On these accounts they often counteract the best and most judicious management. The roots of the crops are liable to become naked and exposed, from storms and various other causes; and if grain, to fall down and be lodged so early in the season as to render them of little value.

Gravelly Soils.—In the state of gravels which contribute to the formation of this class of soils, there is a variation of size in the pieces or particles of which they are composed, from that of a very small pea to the largest cockle. Where they become of still larger dimensions they are termed stones or rocks, according as they are in small portions or large masses ; and the soils are then said to be stony or rocky, as the circumstance of the different cases may happen to be.

The beds of gravel, whether they are of the larger or smaller kinds, are mostly either of the silicious or flinty kind, or of the calcareous or chalky ; but the stones and rocks are of very different kinds. With these dissimilar substances, some others in different states of reduction and pulverization are blended and united in various proportions, so as to constitute gravelly soils that differ considerably in their textures and other properties. The chief of these are loams, and the mould or earthy matter formed by the destruction and decay of numerous animal and vegetable substances.

The gravelly mixture is sometimes also found to approach nearly to the surface, while at other times it recedes considerably from it. In some instances springs rise immediately underneath ; in others they are at a great depth. The bottom, or subsoil, is likewise various ; in some cases it is stony and rocky, in others it is clayey, or a rocky gravel, and sometimes sand, &c.

The open porous nature of gravelly soils disposes them to admit moisture very readily, as well as to part with it with equal facility; from the latter of which circumstances they are subject to burn, as it is termed, in dry seasons, which is not the case in the heavier or more retentive sort of soils.

Gravelly soils, from the lightness of their texture, and their not affording great resistance, except where the stones are large, or where there are rocks, are not expensive or difficult in the means of cultivation. All the necessary business of this sort is capable of being carried forward with much ease and expedition, and the lands are in general soon brought into the proper states for the reception of crops.

Peaty or Mossy Soils.—These soils consist chiefly of the roots of decayed vegetables, mixed with earth, mostly argillaceous, and sand, and a coaly substance derived also from decayed vegetables. They differ, like all the other kinds of soils, according to the nature of the ingredients of which they are constituted or composed, and the proportions in which these are found to prevail in them. Where the vegetable or peaty material predominates but little over the other substances with which it is mixed and incorporated, the lighter sorts of peaty, moory, or heathy soils are formed; but where the other matters bear only a slight proportion to it, the deep and heavy peaty or mossy soils present themselves. In different districts the peaty matter is found of different depths, and of various degrees of density or closeness of texture, probably proceeding from some original differences in the vegetable substances from which it was formed, or the greater advances which it has made to the state of perfect decomposition or decay. The subsoil in most of the deep mossy districts is of the clayey kind, more or less stiff and heavy, over which the peaty or mossy material is deposited, generally in a sort of stratified order ; the first layer of which being commonly not more than ten or twelve inches in thickness, exhibits the appearance of a rich brown earth, in all probability from the incorporation of the loamy or clayey matters, with the peat or vegetable earth lying immediately upon them, and constituting originally, perhaps, the surface of the ground. The layer that succeeds to this is mostly of a dark colour, and considerable thickness, apparently formed of a great variety of vegetable materials in the more perfect stages of resolution and decay, united together by time and other circumstances with more or less compactness and solidity. The uppermost stratum, or that which is placed upon this dense peaty matter, is, in general, of a very pale colour, and a very light spongy texture, arising possibly from the grasses, leaves, and other vegetable substances of which it is formed, not having attained that state of decay which constitutes the darker sorts of peaty earth.

But in the more superficial peaty soils, little or nothing of this stratified appearance is met with. A coat of peaty earth, differing greatly in thickness according to the peculiarity of the situations, and other circumstances, is formed by a great length of time from the destruction and decay of successive crops of grasses, leaves, and substances of the heathy or other kinds, and deposited upon, and intermixed with, the various harder materials of the soils which happened to be underneath them. By these means much variety is produced in the soils. Where the under-strata of earthy matter are tolerably good, and the crops of vegetables large and luxuriant, the better sorts of light peaty soils seem to be predominant; but where the quality of the under-strata are indifferent, and the vegetable products scanty, as well as feeble in their growth, and principally of the heathy tribe, the poor peaty and heathy, or moory soils, are met with.

All peaty soils seem to be thus gradually formed by the deposition of vegetable matter, supplied by the dissolution and decay of aquatic and other plants that grow in low moist situations, as well as substances of other kinds brought down by water, from the high grounds in their neighbourhood, in the states of solution and diffusion, and gradually deposited from it on its becoming in a state of stagnation, by means of obstruction and stoppages proceeding from different causes.

From the nature of the composition of these soils, it is obvious that they must be very retentive of water, especially where they are of any great depth. Hence they seldom or ever become free from the excessive quantities of moisture with which they are loaded in the rainy seasons.

Vegetable Earth or Soil.—This kind of earthy material constitutes the superficial bed or stratum, in which plants for the most part vegetate in every sort of soil, and differs very much in different places, from the variations that take place in its depth, and the greater or less progress that has been made in the several substances of which it is composed, to the stage of perfect decomposition or decay.

Some variety may likewise be caused by its being more intimately or more loosely mixed and blended with the other bodies that are found in soils. It seems probable too, that the earthy matter which is formed from the destruction of some sorts of vegetable substances may be better suited for the purposes of vegetation than that which proceeds from others.

Vegetables, from their containing a considerable portion of mucilaginous matter in a state of mixture with their other substances, become, in some measure, capable of solution in water, though the external surfaces of living plants, on account of the resinous and animalized materials that enter into their composition, are protected from its operation. From the former circumstance, and that of earthy matters being contained in them, which had been taken up in the state of solution with their fresh juices while growing, it is evident that large quantities of vegetable mould must be continually formed and deposited on lands by the natural decay of such substances.

But the formation of vegetable mould or earth is further effected by means of the putrefaction or dissolution of such vegetables as are cut down, or otherwise destroyed, on the surface of the ground, and the application of various kinds of dung and composts. Where these have been in great abundance for a long time, there is mostly a deep rich surface soil of this earth; but where few vegetable products, and those of the less luxuriant kind, have been left to undergo the above process, or little assistance given by means of manures, the crust of surface mould is generally thin and poor. The resolution of vegetable matters is generally promoted by a proper degree of moisture and heat, as well as by a suitable state of the air.

Alluvial Soils are of two sorts: one derived from the sediment of fresh, and the other of salt water. Along the sides of rivers, and other considerable streams, water-formed soils are to be met with, consisting of the decomposed matter of decayed vegetables, with the sediment of streams. They are in general fertile and deep, and not apt to be injured by rains, as they usually lie on a bed of open gravel. They are commonly employed as meadows, from the hazard of crops of grain being injured, or carried off by floods, if cultivated.

Alluvial soils arising from the operation of salt water, called salt marshes, are composed of the finest parts of natural clay, washed off by running water, and deposited on flat ground, on the shores of estuaries, where they are formed by the reflux of the tide, and enriched with marine productions. They generally have a rich, level surface, and being deep in the staple, they are well adapted for the culture of the most valuable crops. Hence wheat, barley, oats, and clover, are all of them productive on this species of soil; which is also peculiarly well calculated for beans, as the tap-root pushes vigorously through it, and finds its nourishment at a great depth. From the great mass of excellent soil, the fertility of these tracts is nearly inexhaustible; but from their low and damp situations, they are not easily managed. Lime, in considerable quantities, is found to answer well upon this species of soil.

From the preceding account of soils, we may perceive that those are the best which contain the greatest store of those principles which constitute the pabula of vegetation. Such are calcareous soils, in which carbon must exist in large quantities, from the natural attraction of lime from carbon, and where there will be a constant supply by means of this attraction. Soils formed from the decomposition of animal and vegetable matters, are in their natures eminently favourable to vegetation; for they contain hydrogen and carbon combined, together with the remains of animals and vegetables, as yet only tending to decomposition, with various salts resulting from the decomposition of animal bodies, water, earth, and gaseous principles.

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USES OF SOIL.

Earths are of no farther service to plants than providing them with a medium by which they fix themselves to the globe, and even the portions of earth taken up into them by vegetation, are not convertible to any other substance, and are supposed to afford the plant nothing but firmness of organization, as wheat and oats, and many hollow stalked grasses, have an epidermis of earth to defend them from the attacks of insects and parasitical plants. Plants are nourished exclusively by means of water and decomposing organic matter. Earths, nevertheless, retain the water, and supply it to the roots; they also afford the means of distributing the proper nutriment, supply, as they are wanted, those parts which are valuable, and prevent the too hasty decomposition. Notwithstanding soils are the genial aliment and support of plants, yet, from their numerous variety of roots, they require a corresponding variety of soil. Roots that are bulbous require a loose soil, such as are fibrous, one more solid, and those possessing those fibrous radicles, a soil considerably more compact and firm than those that have extensive lateral roots. Finely divided matters not only give tenacity and coherence to the soil, but greatly promote vegetation, a small quantity being sufficient to fit the soil for the production of barley or turnips. The latter have been produced upon a soil, eleven parts out of twelve of which have been sand, and the remainder of animal or vegetable matters.

Impalpable matters, however, must not be in too great a proportion. In order to promote the growth of vegetables, friability, and a looseness of texture are requisite in the soil, so that the water, not lying in the soil in a state of aggregation, but being suspended in it, as water in a sponge, may have free access to the fibres of the plant, communicated by capillary attraction; and since alumina possesses the property of adhesiveness, and silex those of friability, in an eminent degree, it is evident that a due mixture of both is requisite to adapt the soil to the common purposes of cultivation. The absorbent power of soil by cohesive attraction, depends in some measure upon the division of its parts, and is highly necessary to fertility, because moisture absorbed from the atmosphere counteracts the effects of daily evaporation, and supplies the plant with moisture in the driest seasons. Stiff clays, which, like pipe-clays, take up the greatest quantity of water when poured upon them in a fluid form, are not the soils that in dry weather absorb the most from the atmosphere, because they cake and present only a surface containing the absorbent powers. To answer this purpose, a due mixture of sand, clay, carbonate of lime and organized matter, are necessary to give that looseness and tightness that shall render it permeable to the atmospheric air. Regard is however to be had to the site and climate in which the soil is situate; the nature and contiguity of the inferior strata, declivity of position, frequency of showers, moisture of climates, &c. exerting considerable influence.

The divisions of soils into cold and hot is extremely natural: some are more heated by the sun than others; and though equally heated, cool in different times. Clayey soils being clammy and moist, are heated with difficulty, and some cool chalks are not easily heated, but retain the heat longer. The soils heated most by exterior causes, are perhaps black, containing much organized matter; coloured soils, under the same circumstances, absorb a greater degree of caloric than those of a pale complexion, especially those possessing a considerable proportion of carbonaceous or ferruginous matter. In dry soils those that are the soonest heated cool the most rapidly; but the darkest coloured dry soil containing a considerable mixture of decomposed matter, cools much more slowly than a clammy, pale, earthy soil.

The above soils are also often characterized from the relative proportion of chemical agency which they contain, earths and earthy carbonates having a degree of attraction for many of the principles of vegetable and animal substances. If an acid solution of alumina be mixed with a solution of soap, the oily matter and alumina will unite, and forming a white powder, will sink to the bottom of the fluid. On the same principle the extract from decomposing vegetable matter, boiled with pipe-clay or chalk, forms a combination by which vegetable matter is rendered more difficult of decomposition. Soils which contain considerable alumina and carbonate of lime, have considerable action of this kind, and from this chemical energy in the preservation of manures and other vegetable nourishment, are denominated rich soils. With siliceous sands it is quite the reverse. The vegetable and animal matters they contain not being subject to attraction as above, are more liable to decompositive evaporation. In the case of black and brown moulds the earth is combined with an extractive matter, which, derived from the decomposition of vegetables, is of primary importance in vegetation.

The quality of the subsoil is often of as much importance as that of the soil itself: it may be classed under two heads; 1st. when it is of the same description as the upper soil, but differing from it only in not having been loosened by ploughing, &c. and enriched by manure; 2nd. where it differs in its nature from the upper soil: in this case it is almost always of inferior quality. The much agitated question, whether deep ploughing beyond the usual depth, is beneficial or not, must depend for its solution on the nature of the subsoil and of the climate. The immediate effect of deep ploughing must in all cases be injurious; but the injury will soon pass away where the subsoil is of the same nature as the upper soil, whereas if the subsoil differs materially in quality from the upper soil, especially where, as is generally the case when it does differ, it is impregnated with the oxide of iron, there is great hazard in deep ploughing; and the mischief can only be eradicated by much labour and expense, by frequent exposure to the air, the application of lime, &c., and by draining.

Removing Obstructions to Tillage.—In the first place; the *removing of stones*, the *eradicating of wood*, the *destruction of different sorts of plants*, and the *removal* of such degrees of *wetness* as may be injurious, before the business of ploughing or loosening the mould of the soil can be properly carried on must be first attended to. The stones that oppose obstructions, in this view, are principally either such as are met with in a loose state in the ground on its being ploughed, or such as are fixed in the soil, and incapable of being removed without much labour and difficulty. Some of these last are often of such a size as to present themselves upon the surface, and cause much land to be lost, by their not permitting the plough to come near them. Those which are concealed below the surface are, however, the most detrimental, as the implements are frequently destroyed, and much inconvenience experienced from them, before they can be perceived by the ploughman, though he may be perfectly attentive to the circumstance.

In all cases, land should be as much as possible cleared from such stones as retard or prevent the operation of the plough before the business of tillage be undertaken; as without due attention in this respect considerable loss may be sustained by the breaking of implements, and the great delay that must take place in the work.

In the clearing of land from wood, different methods must be pursued, according to the nature of the wood with which they are covered. Where there are large trees of the timber kind, they should be completely grubbed up at a proper season of the year, care being taken that the roots be as much as possible removed.

In cases where *broom, furze, brambles*, or *thorn shrubs*, have become of considerable size, the general method of proceeding is to cut them down as close as possible to the surface of the ground, and afterwards to dig round, and grub up the roots in the manner that the larger trees are cleared. With furze it is sometimes customary to set fire to them, in order to uncover their stems before any attempt is made to grub them up; but this is a practice that ought to be as much as possible avoided, from the danger that may attend it, and the loss of the furze, as well as a large portion of the valuable vegetable matter accumulated in many cases beneath them.

As it has been found from experience, that such lands as have been attempted to be cleared from brushy plants of this kind, especially those of broom and furze, are extremely liable, from the roots and seeds that may be left in the soil, to have them coming up again in great abundance after they have been laid down to grass, it should be a practice to keep lands that are much disposed to their production in a state of tillage for such a length of time as may be fully sufficient, by the various means of cultivation, and the application and blending of lime and other suitable manures with them, to have them as completely removed as possible; and that when they are restored to the state of grass, to have them pastured, as much as can be conveniently done, with sheep.

Heathy lands should be cut as close to the surface of the ground as it can be conveniently done; and lime in its caustic state, should be applied in large proportions. When this sort of ground has been broken down and pulverized as much as possible by the operation of ploughing and harrowing, it should always, where not too stiff, be sown with some sort of close, luxuriant, green crop, such as turnips, pease, and tares, that may be fed off by sheep; but where it has a sour quality, and is more stiff, clayey, and adhesive with those plants that strike more deeply into the soil, as beans, rye, and oats of the gray kind. In many cases too, rape, pease, clover, and vetches, will succeed in a very beneficial manner. But as the principal intention in most cases of breaking up this sort of land, is that of bringing it in a cheap and expeditious manner to a suitable condition, after a grain crop or two, for growing grass, the green crops, of whatever description they may be, should be consumed by animals upon the ground.

In whatever method such lands may be brought into the state of cultivation, the processes of tillage should not be carried further than the destruction of the heathy or other coarse plants, and the removal of the sour and unfriendly dispositions of such soils for the growth of useful vegetable production. They should then be restored as soon as possible to the state of grass or pasture.

There is another description of land that is frequently to be brought into the state of tillage; this is that of the *boggy* kind. In these the first thing, after having them well drained by the cutting of proper ditches, which, where they are large, may serve for their enclosure, is by giving the ridges a suitable form: in order to aid this, pare off and level the surface by means of the spade or plough; such matters as are of little value being deposited in the hollows, while those that are of a good quality may be mixed into a compost with good dung, where it can be procured, or with lime; together with the spare earth taken from the ditches, which should be immediately spread equally over the land, and incorporated as much as possible with it, by ploughing it up with a very slight or ebb furrow, in order that the uniting materials may not sink too deep for affording due support to the crop that may be cultivated on it. Indeed, though deep ploughing may sometimes be of utility in first opening up these soft soils, it should never be had recourse to when the application of manure is to be made; and on this account also the ploughings after the taking of different green crops should only be slight. It is seldom proper to continue soils of this description for any great length of time in the state of tillage, as from their great moisture, on account of the general flatness of their situations, and their being liable from continued ploughing to become very loose and open, so as not to afford proper nourishment and stability to the roots of the crops, this sort of land will in general be the most advantageous in a state of grass.

The most beneficial sorts of crops for these soils will in general be turnips, rape, or potatoes.—The light and drier parts will be the most adapted to potatoes, as their bulbous roots will be there the most able to spread and extend themselves, and consequently produce large crops. These crops will, in the stiffer sorts of these soils, leave the land in a suitable condition for wheat or oats, and in the lighter for barley or rye.

Moss lands, from their being much disposed to the throwing up of grass, are not so proper for the growing of grain crops, but a crop or two may frequently be taken after potatoes or turnips, especially where liming has been performed some length of time. Oats and barley are mostly good crops, but such land is often too light for wheat. Where barley is employed, grass seeds are frequently sown with it, but it is probably a better practice to put them in separately. On these soils, rye-grass, as well as white and yellow clover, have been found to thrive extremely well, especially where they were in a proper state of preparation for them, as by the growth of potato or turnip crops. And though red clover has not always succeeded, it is probable, that in such mosses as are not of the deep kind, it will prove an useful plant. In some districts, it has been found that clover may be sown with great advantage immediately aftes the potato crop, when it has been taken off early.

It is evident, from what has been advanced, that as there is much variety in soils of this kind, they will of course require different modes of tillage. Where they are very thin, and deposited upon a loamy or clayey substratum, it may be a good practice to plough so as to bring up a portion of them, by which, and the use of lime, the land may be rendered highly productive.

IMPROVEMENT OF SOILS.

For the improvement of soils, numerous methods have been devised, such as by pulverization, by fallowing, by incineration, by consolidation, by exposure to the atmosphere, by an alteration of their constituent parts, by changing their condition in respect to water, by a change in the kinds of plants cultivated, and by their position in respect to atmospherical influence.

Pulverization.—This is needful, in the best of soils, to facilitate the admission of air, rain, the warmth of the atmosphere, &c.: the first object of this is to give scope to the roots of vegetables, on the numerous fibres of which the prosperity of every plant in a great measure depends; and also to increase the capillary attraction of the soil, by which its moisture is more uniformly applied. Water being essential to the growth of plants, not only by its immediate application, but by that operation by which it facilitates the extraction of vegetable matters, the soil, if not naturally so, should be so constituted artificially, as to retain a requisite portion; for the want of water will impede the germinating principle, and render even manure an ineffectual auxiliary. The different species of earths, being among the worst conductors of heat, it is necessary to lay the land open, and by the free ingress of the warm air, and tepid rains of spring, artificially to increase its temperature. Pulverization also contributes to the increase of vegetable food, conveys water, and with it carbonic acid gas, to the roots of vegetables; accelerates the putrefaction of vegetable and animal substances by the combined actions of heat, light, air, and moisture, buries a portion of the atmospheric air in the soil; in short, so numerous are its advantages, that Tull and others conceived no other assistance to be necessary. No principles, however, admit of indiscriminate application; for while the pulverization of some lands contributes to their improvement, there are others that require consolidation.

"*The depth of pulverization*," Sir H. Davy observes, "must depend upon the nature of the soil, and of the subsoil. In rich clayey soils, it can scarcely be too deep; and even in sands, unless the subsoil contains some principles noxious to vegetables, deep comminution should be practised. When the roots are deep, they are less liable to be injured, either by excessive rain or drought; the radicles are shot forth into every part of the soil, and the space from which the nourishment is derived is more considerable than when the seed is superficially inserted in the soil."

The practice of fallowing is attended with numerous advantages to soils; the weather has free admission to their interior parts; the soil is thus heated to a degree which would be impossible while covered with foliage; weeds are in a great measure eradicated, and the top, bottom, and middle of the soil more effectually blended. Where fallows are judiciously applied, and the land by frequent ploughing and harrowing left for twelve months, in a state of constant tillage and movement, the profits will amply repay both the trouble and expense. Soils are to be altered by the addition of those ingredients in which they are deficient, and the subtraction of those in which they abound. Thus a soil strongly impregnated with sulphate of iron will be sterile, but it is to be improved by the application of quick-lime; also a soil containing too great a proportion of peat, drifted sand, gravel, &c., is to be improved by taking them away, as the most simple and effectual mode.

Sir Humphrey Davy thus explains *the theory of burning soils*. He says, "it rests entirely on chemical doctrines. The bases of all common soils are mixtures of the primitive earths and oxide of iron; and these earths have a certain degree of attraction for each other. To regard this attraction properly, consider the composition of any common silicious stone. Feldspar, for instance, contains silicious, aluminous, calcareous earths, fixed alkali, and oxide of iron, which exists in one compound, in consequence of their chemical attractions for each other. Let this stone be ground into impalpaple powder, it then becomes a substance like clay; if the powder is heated very strongly, it fuses, and, on cooling, forms a coherent mass similar to the original stone; the parts separated by mechanical division adhere again, in consequence of chemical attraction. If the powder be heated less strongly, the particles only superficially combine with each other, and form a gritty mass, which, when broken into pieces, has the character of sand. If the power of the powdered feldspar, to absorb water from the atmosphere before and after the application of the heat, be compared, it is found much less in the latter case. The same effect takes place when the powder of other silicious or aluminous stones is made the subject of experiment, and two equal portions of basalt ground into impalpable powder, of which one-half had been strongly ignited, and the other exposed to a temperature equal to that of boiling water, gained very different weights in the same time when exposed to air. In four hours, the one had gained only two grains, whilst the other had gained seven grains. When clay or tenacious soils are burnt, the effect is of the same kind; they are brought nearer to a state analogous to that of sands. In the manufacture of bricks, the general principle is well illustrated; if a piece of dried brick-earth be applied to the tongue, it will adhere to it very strongly, in consequence of its power to absorb water; but after it has been burnt, there will scarcely be a sensible adhesion."

The soils improved by the burning process, are those which contain too much dead vegetable fibre, and which, in consequence, lose from one-third to one-half their weight by torrefaction; and those which contain a superabundance of stiff clays and marls; but poor sandy soils are injured by this process. The common advantages of incineration are, that it renders the soil not only less compact, but less tenacious, and retentive of moisture; affording considerable improvement to such as are cold and damp. It diminishes the coherence and tenacity of clays, and destroys useless vegetable matter, converting it into manure. The water of the soil should be withdrawn when abundant, and when deficient should be supplied. Stagnant water is exceedingly pernicious to all classes of useful plants. Springs are more injurious than surface water, as being colder and generally permanent. Hence the propriety of under-draining, &c., as well as removing every obstacle that would prevent the percolation of water to the strata below.

The great art of *irrigation* is the imitation of nature in all her various modes of communicating moisture, applying water especially in the morning and evening at moderate intervals, and under a clouded sky. It may be applied by surface or subterraneous irrigation. If employed too frequently, it would produce the same effects as attend stagnant water, land springs, or aquatic soils. If applied after hot sunshine or other violent heats, it would check evaporation and destroy life. That water in which fish thrive is generally the best for meadows, and the overflowing of alluvial lands may be also employed to manure and enrich the soil. Shading, sheltering, &c., by walls, hedges, plantations, &c., changing the condition of lands with respect to solar influence, by erecting mounds, and forming slopes, so that the surface may be more or less at right angles with the plane of the sun's rays, have frequently a very beneficial influence upon the quality of the soil.

MANURES.

An increased population requires more abundant stores of food for man, and the beasts immediately under his command, than were before necessary: to this end, where the extension of land cannot be obtained, recourse must be had to the enriching of that which is already in possession, whenever it becomes deteriorated by constant and heavy cropping, with such plants as exhaust the pabulum of vegetables; and also to improve such soils as are by nature less adapted than others to the production of advantageous crops.

Besides the methods we have already spoken of for the improving of lands, mankind have discovered various substances, which, when judiciously applied, possess the power of increasing the fertility of soil in a wonderful degree. The substances are numerous, and always near at hand. They arise from the decomposition of animal and vegetable matter, and from the agency of fossil and saline substances.

From the changes that are constantly taking place among bodies in nature, and the new combinations which are formed in consequence of those changes, a great variety of matters are unfolded, elaborated, and prepared for the nourishment and support of vegetable life.

Some of the substances which contribute in this way possess considerable fluidity and volatility, such as *water*, and various gaseous materials, as *oxygen*, *hydrogen*, *azote*, and *carbonic acid*, in different states of combination; while others are more gross and heavy, and require to be applied and incorporated with soils, or spread out upon their sufaces, in order that they may produce their effects in promoting vegetation. It is principally to these, as being the means of sustaining different sorts of plants as crops, that the term manure has been given by practical writers on agriculture; though it is extremely obvious that they must undergo different changes, and be resolved into their more elementary principles, before they can be taken up, and contribute to the increase and support of vegetables. In the various materials which the art and industry of mankind have rendered capable of being beneficially employed in this manner, there is great diversity; some are found to yield the matters which are necessary for the support of plants much more readily and more abundantly than others, as animal, vegetable, and all such substances as are rich in mucilage, saccharine matters, and calcareous earth, and readily afford carbon, phosphorus, and some aerial fluids; while others, that are greatly deficient in all or many of these principles, or do not readily part with them, are found to be of much less utility, when employed in the way of manures. This is probably a principal reason why some sorts of manures, or substances, when put upon grounds, are so greatly superior to others, used at the same time, and in the same manner and proportion.

There are, however, many other ways in which substances, when applied to soils, may render them more fertile and productive, and contribute to the aid of vegetation. Some, besides furnishing such matters as are suitable for the purpose of promoting the growth of plants, are known to add considerably to the quality of vegetable and other matters contained in the soils on which they are placed, and thereby provide a more suitable and convenient bed for the reception of the roots of plants; others contribute little in this way, but operate chiefly upon such materials as are contained in them, breaking down their organization or texture, and thus setting at liberty different volatile and other ingredients, by which new compounds are formed, and brought to such states as are the most adapted to the support of vegetable life; others, again, act principally by producing certain changes and alterations in the constitution or texture of soils, such as rendering them more open and porous, or more stiff and compact, and by such means bringing them into the most proper conditions for the bearing of different vegetable productions; and there are still others that contribute in all or several of these ways at the same time.

Substances of the animal kind, when reduced by the process of putrefaction, or other means, into a soft, pulpy, or mucilaginous state, are found by experience to afford those matters which are suited to the nutrition and support of plants with greater readiness, and in more abundance, than most other bodies that can be employed. By chemical analysis it has been seen, that the component materials of these substances, so far as agriculture is concerned, are principally water, jelly, or mucilage, and saccharine oleaginous matters, with small portions of saline and calcareous earthy substances. Hence animal matters, though they agree in some circumstances with vegetable productions, each having, in common, water, saccharine and calcareous matters, are far more compounded; and in animal substances, some of these materials are in large proportion, while in vegetables they only exist in a very small degree; and the jelly, which in some measure resembles the gum and mucilage of plants, differs likewise from them, in its having much less tendency to become dry, as well as in its property of attracting humidity from the atmosphere, and of running with great rapidity into a state of putrefaction and decay.

All these principles of animal substances are resolved by their ultimate decomposition into other matters, such as the different gaseous fluids that have been mentioned above—carbon, phosphorus, lime, &c.

Animal substances of every kind, on being deprived of their vital principle, have a quick tendency to take on or run into the state of putrefaction; a process which is considerably affected and influenced by the circumstances under which it is produced. But in the horny and more compact animal matters, this tendency to putrefaction and decomposition is, under similar circumstances, much less rapid than in such as are of a less firm and dense texture.

Hard Animal Substances.—In the matters of this sort that are employed as manures, there are considerable differences in respect to their texture and firmness, some being quite firm and solid, such as *bones*, *horns*, *hoofs*, *shavings of horn*, and some other similar substances, while others are more soft and pliable. The *bones of all animals* are capable of affording much nutritious matter to plants, but those which are procured from cattle that have been killed when fat, are the best for the purposes of manure. Those which have been boiled are far inferior, in this view, to those which have not undergone that process, as by such means they are principally robbed of their oily and mucilaginous properties, and consequently must yield much less nourishment to the immediate crop, whether it be grain or grass. All these sorts of substances require to be ground down in mills constructed for the purpose, or otherwise reduced into small pieces, before they are laid on and mixed with the soil. They are excellent for potatoes.

These substances are constituted of a considerable proportion of mucilaginous or gelatinous matter, a slight portion of fat, and an earthy salt, composed of the phosphoric acid and calcareous earth. If great heat be applied, they afford a large quantity of hydrogen gas, carbonic acid gas, and a volatile alkaline liquor. From the nature of these different principles, it is evident that some sorts of substances may be blended and united with the reduced particles of bony matters, so as to promote their effects, as manures, in a considerable degree, such as lime, chalk, peat, earth, and good vegetable mould, in suitable proportions, as by such means new combinations may be formed, highly favourable to the process of vegetation.

Soft Animal Substances.—There are various matters of this nature, that may be of use for the purpose of improving land as manure, some of which have yet been but little attended to by the farmer. Of this sort are *greaves*, or the *residuum* which is left after the making of candles, and the *scum* which is collected in the boiling or refining of *sugar*.

Different trials with the former have fully convinced us, that it is a substance that possesses great powers when employed as a manure; and although it is a substance which is generally procured at a high price, from its going a great way, and being a lasting manure, it may probably be more frequently had recourse to than has hitherto been the case. It is mostly procured in the state of hard compressed square cakes, though sometimes in a soft condition, without having undergone any pressure. When in the former state, the cakes must be broken down and reduced into as great a state of division as possible, which may be rather a troublesome and expensive process, except a mill, or some proper machine for the purpose, be employed. But when it has been even reduced to the finest state possible, it will still be improper for application as a manure, until it has been mixed and incorporated with a pretty large proportion of some rich earthy substance with which it may combine. It is excellent for turnips.

A combination of *lime* and *greaves*, mixed with mould from the head-lands, in the proportion of about fifty bushels of lime to a ton of *greaves*. This composition resembles sugar scum, which consists of lime and bullocks' blood.

Lime might thus be combined with *bones* or *woollen rags*, or with a compost of *earth* and *night-soil;* and would certainly greatly facilitate their conversion into manure, as well as render them more active in producing their effects in the support of vegetable crops; and by some of their properties being absorbed by the lime, during the time of their decomposition, and afterwards parted with more slowly in the soil, they may also, by such means, be probably rendered more durable and lasting as manures.

Lime operates upon other substances intended for manure, as a kind of yeast; it requires therefore to be well mixed, that every portion of the manure may be properly fermented.

There are still some more substances of the animal class, such as the *blood*, *scum*, *wool*, *hair of animals*, *refuse of glue-makers*, *the cuttings of felt-mongers*, *the clippings of furriers*, *the scrapings of oil-leather*, *and the chips or waste of shoemakers*, which may be made use of as manures, when they can be collected in sufficient quantities. These animal materials, from their abounding in mucilage and oil, their great attraction for moisture, and their being readily soluble in water, contribute quickly to the support of vegetation, but are not probably so durable in their effects upon land as many other substances. Hence they should only be made use of with a view to the immediate crop, which, we believe, is pretty much the case in those places where they can be obtained in such quantities as to be employed for the purposes of agriculture.

Various animal substances of the fish kind, as the *blubber* remaining after the preparation of oil from the *whale* and other large fishes, and different sorts of small *fish*, both of the shell and other kinds, may be employed as manures; and also the offals of such animals, where they can be procured in a large quantity, as in large towns, sea districts, and where they are cured or prepared in great numbers for the market.

These substances may be readily reduced to that state which is proper for manure, by mixing with them a small portion of the carbonate of lime, and afterwards, according to circumstances, a quantity, two or three times more than the whole, of good vegetable mould.

The refuse of slaughter-houses and butchers' shops may likewise be prepared and made use of in a similar manner to that of fish. For as the manures that are formed from these animal materials are capable of affording much elastic volatile matters during their decomposition, they of course require to be well mixed and blended with such earthy substances as they can combine with, and render soluble, and in proportion suited to their powers, in order to produce the most beneficial effects on vegetation.

Animal Dungs.—The animalized substances that are, however, most generally made use of as manures, are the excrements of various kinds of animals, which are found in very different conditions, or states of preparation and richness, proceeding in some measure from the kind of food upon which the animal has been fed, the matters with which they are incorporated, and the texture of the substances themselves.

The *dung of fat animals* is unquestionably more rich, and consequently possesses greater powers of fertilization than the dung of lean ones; and the quality of the dung of every sort of animal will in a great measure be proportioned to the goodness or poverty of its food. Thus, when the animal is fed on oily seeds, such as lint, rape, and others of a similar nature, it will be the most rich; when kept on oil-cake, or those seeds which have been deprived of part of their oily matter, the next so; on turnips, carrots, and such-like vegetable roots, the next; on the best hay, next; on ordinary hay, next; and on straw, perhaps, the poorest of all.

The *urine of animals* appears to be a more perfect extract from the animal system than the other; it is, therefore, surprising, that this valuable substance is not more attended to by agriculturists. Let it be mixed with the dung-hill, or else carted to the field after it has passed through the putrefactive fermentation. Its effect on land is immediate.

Some manures of this kind, such as the *soil of privies*, is sometimes met with in a state fit to be applied to the ground, when not much mixed with fluid matters, such as urine. It most frequently happens, however, that it is in such a liquid state as to require other more solid substances to be blended with it, before it can be conveniently applied to the soil. In doing this, too little regard seems to have in common been paid to the choice of the most proper materials; but it is obvious, that such as can be the most fully acted upon, and the most readily converted into the states suitable for affording the nutrition of vegetables, by the principles of the matters thus employed as manures, must be the most adapted for the purpose, as well as the most beneficial. When, therefore, the manure made use of in this way is either wholly or principally constituted of such animalized matters, as from their fluidity are in an improper state or condition to be set on land without having other substances previously mixed with them, such peaty, boggy, or black vegetable earths should be chosen as contain large proportions of matter, which the ammonia or volatile alkali, so abundantly provided by the decomposition of such substances, may exert itself upon, and reduce into that state of solubility which is suitable for promoting the growth of plants.

The results of experiments attentively made in this way, indeed clearly demonstrate that an inconceivable loss is incurred by the inconsiderate practice of exiccating human excrement, as well as the negligent custom of permitting the gaseous or liquid parts of dung-heaps to evaporate or run away. The trials which we have been enabled to make, also lead us to suspect that it is a much more wasteful practice to apply these liquors to ground in their uncombined state, than in conjunction with such earthy materials as have been mentioned above. Besides, much of them must be imperceptibly carried off, by the process of evaporation, even when they are carried out in the most favourable seasons of the year; and they cannot in this way always be made use of on those soils that contain a sufficient quantity of those earthy materials or principles with which they can readily form combinations, and exert their most beneficial and fullest effects. It may be demonstrated, by experiment, that yard and stable dung should be applied to the land in its half decomposed state, and not be suffered to remain in heaps until the putrefactive fermentation has reduced it to over putridity.

We are decidedly of opinion, that the soil of privies is a manure of the most enriching kind, but that its effects are not so lasting as those of many other substances. In some trials which have been lately made with it, it has produced such astonishing fertility, as induces us to conclude that it exceeds all other sorts of manure that can be put in competition with it, for the first year after its application. The second is of some service, but in the third its effects nearly, if not quite, disappear. The circumstances which render this sort of manure so immediately active in promoting vegetation, and so quickly deprived of its beneficial influence, would seem to be from the great quantity of elastic principles which it contains in a loose state of combination, and the small quantity of earthy matter which it is capable of supplying to the soil, by the last stages of decomposition or decay.

This view of the nature of the manures afforded by different animals, should lead the practical agriculturist to be more attentive to the subject, in order that he may render them more abundant, and be capable of employing them under the most favourable circumstances, which cannot be the case while they are, as at present, indiscriminately mixed and blended in the common dung-heap.

It is, however, from the larger animals, that the farmer derives the principal part of the dung that is made use of as manure, in the cultivation and improvement of land. The dung of such horses as are highly fed being found, as has been already seen, to be much more valuable for the general purposes of agriculture, and some uses in horticulture, than that which is made by horses when fed with hay or grass only. Where the animals are kept in the latter way, it is probably not so good as that of well-fed cows, and neat cattle in general, as in these it may, perhaps, become more animalized from the circumstance of their food being more intimately blended with the saliva, or other juices, during the ruminant state of feeding in such animals. The dung of horses is, however, in common much more disposed to the process of putrefaction, and causes more heat than that of cows and other neat cattle; and indeed these are the chief distinguishing circumstances between them as manures. The dung of neat cattle may also, on account of its less disposition to run into the state of putrefaction, contribute more of the earthy material to the land on which it is applied. Hence, probably, its superior utility on the leaner and poorer or thinner sorts of soil. The dung and urine of animals when newly voided, are not, except when the animals are morbid, in a putrescent condition, the length of time in which they remain in their bodies being too short for its fully taking place; but some degree of, or tendency to putridity, is constantly necessary to their discharge.

From the experiments that have been made with the dung of sheep, it is evident that it is equally valuable with that of many other animals that feed in the same way, but agriculturists have not yet turned their attention sufficiently to the means of collecting and preserving it, so that it may be used alone as a manure. The method by which it is at present applied to land is by folding the animals upon it, under which method of management, on many soils, a great part of the advantage must be derived from the operation or action of the ammonia of their urine upon the vegetable matters contained in them, as well as from the consolidation produced by their treading. It is well known that the urine and dung of sheep want no fermentation previous to its being applied to the land; the sooner therefore the seed is sown after folding, the greater is the effect.

Vegetable, as well as animal substances, when deprived of their vital principle or life, are soon rendered fit, by the separation, reduction, and ultimate decomposition of their constituent principles, for the nourishment and support of new plants. This process is greatly promoted, in all kinds of substances, by the materials being exposed to the free influence or agency of atmospheric air, moisture, and a middling degree of heat; various matters are set at liberty, by which different new combinations take place, that are capable of promoting vegetation in different degrees, and upon which their utility as manures, perhaps, chiefly depends. The stages of this decomposition have generally been supposed regularly to succeed one another, from that which is productive of sweetness, through the vinous and acetous, to that which is the ultimate result of putrefaction. Different parts and sorts of organized matters, when dead, undergo many different sorts of chemical changes, which are different according to the degrees of heat, the quantity of water, and of air, to which they are exposed.

In the vinous fermentation or process which commences after the saccharine, carbon becomes united with pure air, in a large proportion; and it is probable that, at the moment of their combination, while they are in the form of a liquid, and before they assume the gaseous state, they may be taken up by the roots of vegetables.

The substances of the vegetable kind that may be advantageously converted into manure are so extremely numerous, that it is impossible within our limits to describe them. All kinds of green vegetable productions may be employed in this way; such as the luxuriant weeds of rivers, lakes, ponds, and ditches; fern, and the refuse of different kinds of garden vegetables. Where green materials of this nature are made use of, they should always be cut down while in their juicy state, just before their flowers begin to appear, in order that they may be in the most suitable condition for becoming quickly putrid, and to prevent the injury that might otherwise be sustained from the vegetation of their seeds. They are afterwards to be collected into heaps of a moderate size, and their putrefaction promoted by their being thrown together as lightly as possible, and the occasional sprinkling of them with water, if the season be hot and dry; and as lime is found, when applied to vegetables in their green moist state, to disengage from them both hydrogen and azote, by the combination of which volatile alkali is produced, it may be advantageous to blend a portion of lime at first with the heaps, and afterwards add a suitable quantity of peat earth, or good vegetable mould, for the alkali thus formed to act upon. By this method, the quantity of manure from such substances may be greatly augmented, and rendered more valuable. But from dry materials, such as hay, straw of different kinds, fern, and rushes, such additions cannot be had recourse to with equal success, unless where much of the dung and urine of animals have been incorporated with them; their resolution and decay may be greatly promoted by their being kept in a state of moisture, without the water being suffered to stagnate upon them, and by their not being permitted to be trodden down too much by cattle, or by other means, in the farm-yards.

Another beneficial means of vegetable manure, which is yet far from being sufficiently practised, is that of providing full crops of succulent green vegetables, such as clover, buck-wheat, tares, vetches, spurry, pease, beans, turnips, and many other similar plants, to be turned down by the plough, in order that they may undergo the putrefactive process under the ground, and by that means be converted into manure, and supply the nutrition of plants.

Sea-weed is another vegetable production which is capable of being employed as a manure with great advantage, and should never be neglected where it is within the reach of the farmer. In some places it is the practice to spread it upon the lands as soon as possible after being cut from the verges of the rocks, on the different sea coasts, or collected after being left by the tides, and to plough it in; where this method is adopted, as little time as possible should be suffered to elapse after the cutting or collecting of the weed, before it is ploughed down; for as the plant in its green or succulent state readily decays and becomes putrid, if there be any considerable delay in the performance of the business, especially when the weather is hot, much of its valuable properties as a manure is dissipated, and carried away by means of evaporation.

Bark, which has been made use of for the purpose of tanning leather, may likewise be employed as a manure; when used in this way it should be collected into moderate sized heaps, before it has become dry by too much exposure to the heat of the sun and wind; and then by having a quantity of lime mingled with it, and being kept slightly moistened with water, its putrefaction and decay may be greatly promoted.

The *mud* taken from the bottom of rivers, ponds, and other places where water has stagnated for some length of time, fresh or maiden earth, and the scourings of old ditches, are substances that may frequently be employed with advantage as manures, being principally composed of the recrements of decayed vegetable matters. They should not, however, be put upon grounds, especially those under grass, until they have been reduced into a considerable degree of fineness, by means of frequent turning over, and the mixing of a portion of lime, rotten dung, or other materials of the same kind, with them, in order to promote and render the decay of the solid parts fuller and more complete.

Marl, like lime, is a stimulant for forcing the soil to produce crops of corn and grass. It consists of two kinds—shell-marl, and earth-marl. Shell-marl consists of animal shells dissolved; earth-marl is a fossil. The colour of the latter is various, white, black, blue, red; and its hardness is as various as its colour, being sometimes soft as clay; and at other times hard and solid as stone. It promotes vegetation in all the different ways; feeds the plants, communicates to the soil a power of attracting the food from the air, enlarges the pasture of plants, and prepares the vegetable food for entering their roots.

Substances of the calcareous kind, which are to be considered under this head, produce effects more or less powerful in promoting the growth of vegetable crops, in some measure, according to the state and quantity in which they are applied, the nature of the soils on which they are employed, and the properties of the matters with which they are combined.

Substances that contain much saline matter in combination with their earthy and other ingredients, are found, in many instances, when properly employed as manures, to contribute greatly to the support of vegetation. The materials principally made use of in this way, are the refuse of different manufactures, such as bleaching and soap-boiling, where they can be procured in sufficient quantities, as in the vicinity of large towns, and where such manufactures are carried on in an extensive manner; the ashes remaining after the combustion or burning of various green vegetable matters, wood, pit-coal, peat, &c., and some other substances, such as soot and sea-salt.

It is most probably to the different alkaline principles contained in these substances (from the great facility and power which they possess of acting upon and dissolving the parts of animal and vegetable matters, especially such of the latter kind as have been rendered insoluble by the absorption of the oxygen, or pure air of the atmosphere, from long or frequent exposure to it), that their beneficial effects as manures are chiefly to be ascribed.

But these substances, besides their forming in the soils, or the earthy materials with which they are mixed, such compounds as are beneficial in promoting the growth of vegetables, may be useful in many cases when properly applied, and used in sufficient quantity. In correcting acidity, in altering the state or condition of the lands, as by the taking away of moisture from the surface, where it prevails in an over-proportion in meadows and pastures, which thereby support crops of coarse vegetables, and by rendering the texture of such grounds as are under the plough more open and friable, consequently more suitable for the reception of the roots of corn crops.

It is evident, from what has been already observed on the nature of the different substances that are capable of being made use of as manures, that they may be frequently mixed and blended with each other, or with substances of other kinds, and by such means be not only considerably increased in quantity, but in many cases rendered more effectual and more suitable for application than in their simple states; but at the same time, that some of them may be mixed and incorporated in this way with much more advantage than others; for though the general experience of farmers has fully shown the great importance and utility of employing compound manures, or composts, little attention has, till lately, been paid to the compounding or mixing together of such substances as are, from the principles which they originally contain, or which are formed from them in the changes which they undergo in the different stages of their decomposition, adapted to act in the most suitable manner for producing such combinations or alterations in the materials, as are capable of being beneficial in the promotion of vegetation when they are employed as manures.

Farm-yard manure, which is the most general application of any, from its being formed by the decay of various kinds of vegetable matters, such as hay, straw, fern, and many other materials of a similar nature, with which the dung and urine of animals is incorporated and combined, must be considered as a compound substance. And from the large proportion in which such vegetable productions enter into its composition, and the quantity of earthy materials that is in most cases, especially where the management is upon a judicious plan, added by the laying of suitable bottoms, it is not so frequently necessary to be blended with other substances that are usually employed in forming composts. But from most of the vegetable materials that constitute the chief part of this sort of manure, being made use of in a dry and hard state, they do not so quickly ferment or run into the state of decay, notwithstanding the proportion of animalized matters that may be mixed with them; it therefore becomes a useful practice to turn them over, by which their complete putrefaction may not only be promoted, but the different materials be more minutely blended together, on both which accounts they may become more useful when applied as manure upon land. In the forming of this manure, care should also be constantly taken that the heaps be so situated as that they may not become too dry, or too much soaked in water, as in either case they must be greatly injured. Whenever it may be requisite to incorporate any earthy material with this sort of manure, the agriculturist should always carefully attend to the state or richness in which it may exist in the yard, and proportion such additions accordingly. It will, however, never demand nearly so large a proportion, as such manures as consist almost wholly of animal matters.

Where animal matters are collected and thrown together in any quantity, there can be little doubt but a great increase of good manure may be provided by mixing with them, as has been already observed, rich surface-mould, peat-earth, or the scrapings of old ditches and roads; as by such a practice the ammonia, formed during the decomposition of the animal substances, is prevented from escaping, as would otherwise be the case, which, by combining with and acting upon the earthy materials, quickly renders them proper for the purposes of manure. As substances of the animal kind have been shown to run very rapidly into the state of putrefaction, they may frequently be incorporated with such vegetable materials as are little disposed, or with difficulty made, to rot or become putrid, and by such means useful composts be more expeditiously formed. In making use of such earthy substances as have been mentioned, it may be of much advantage to have them exposed to the influence of the atmosphere for a considerable length of time, frequently turning them over, before they are mixed with the manures, as by such means they become in a more pulverized state, and are capable of being more intimately blended with such materials, and afterwards spread over the land with much greater equality, a circumstance upon which their effects very much depend. If, in performing this business, the earthy substances be formed into a sort of ridge, about five or six feet in height, and nearly the same breadth in the bottom, they will be in the most proper situation for being united with dung, or other matters that may be employed.

In the application of manure to land, several circumstances are necessary to be considered, such as the state or condition of the substances which are to be made use of, the nature of the soils on which they are to be laid, the kind of crop that is to be promoted by them, and the season in which they are put into or upon the ground.

As we have already seen that changes are continually taking place from the moment the materials of the dung-heap are thrown together, to the period in which they are reduced into a black carbonic earthy matter, and that in most of the different stages through which they pass in this process of decomposition, such substances are formed as are capable of contributing to the nutrition and support of vegetable crops; it seems probable, that in cases where manures are to be turned into the ground, and such crops cultivated as require a supply of nourishment for a considerable length of time, they should be employed in their long or more imperfectly reduced states, as by the heat which is evolved in the commencement of their dissolution, the process of early vegetation may be greatly promoted, and their gradual decomposition and decay afterwards, under the ground, afford a more durable and regular supply of nutrient materials, and thereby contribute more effectually to the growth of the crops; but that where they are to be buried in, or applied to, the surface of the soil, and intended merely for the benefit and support of such crops as are of short duration, or quickly arrive at their full growth, they may be more advantageously made use of after they have been more fully and completely reduced, as in this state the manure is, in the case of grass lands, not only capable of being spread out in a more regular and uniform manner, by which it becomes more evenly as well as more generally carried down to the roots of the plants by rains, but it is in the most suitable condition for allowing the young plants the means of springing up with facility, and at the same time, whether used under or upon the soil, of affording the crops that abundant supply of nourishment which is necessary to their speedy growth and great luxuriance, and by these means to contribute the most perfectly to the promotion of their increase.

And as in the slow and gradual decomposition of the materials which are made use of for manures, when slightly deposited beneath the soil, there is much less waste of heat and those elastic matters which contribute so greatly to the support of vegetation, than where they are made to undergo the various processes of dissolution in large masses, as in dung-heaps, they may probably sometimes on that account be most advantageously employed in this state.

On this principle too the ploughing down of fresh vegetable crops, in many cases, in their most succulent states, may be a more economical as well as more beneficial practice; especially in such light and dry kinds of soil as will more readily admit of their gradual putrefaction and decay, than to cut and take them off for the purpose of being by other means converted into manure. It seems likewise probable, on the same grounds, that for the production of crops of bulbous-rooted vegetables on the more stiff and tenacious soils, the matters made use of as manures may be employed with the greatest advantage, when put into the earth before they have undergone any great degree of decay by means of putrefaction, as in this way there is no waste, the whole being ultimately converted and applied, though more slowly, to the support of the crops.

As to the seasons in which manures may be put into the soil, or spread out upon its surface, with the greatest benefit and advantage (though in practice it must, in some measure, depend on the state of the land and the convenience of the farmer), it should, in cases where they are buried in the ground, be as nearly as possible to the periods in which the seeds or roots which they are designed to support, are sown or placed in the earth; and in the latter case, or where they are to be laid upon the surface of the land, it ought to be just before the crops of grass, or other vegetables, begin naturally to spring or shoot forth.

And by the application of such manures as are employed in the way of top-dressings in the beginning of the spring, they are laid on in the most favourable periods for affording their nutritious principles, and for their being drank up by the roots of plants, consequently become useful at the time they are most wanted for the promotion of the crops, and the great waste which must otherwise be caused, either by the excessive falls of rain and floods in the winter season, washing down much of the valuable properties into the adjoining rivers and ditches, or the evaporation of their more volatile or elastic matters by means of the summer heats, is most effectually guarded against and prevented.

On all these accounts, therefore, farmers should contrive as much as possible to apply the manures, intended as top-dressings to grass lands, as early in the spring as it can be conveniently done, which may be easily managed on those that are dry, and on such as are inclined to be wet and poachy, it may probably be greatly facilitated by having small light carts constructed for the purpose, and placed on broad cylinders as wheels.

In the application of manures to lands under tillage, as well as those in the state of grass, there are a few other circumstances that require the attention of cultivators; such as the depth they may be deposited in the soil, the modes of putting them upon the ground, and the most economical methods of employing them.

In respect to the advantage of using one sort of manure in preference to another, it may be observed, that as animal matters are found in general to undergo more speedily the process of putrefaction or decomposition, than those of the vegetable kind, and as in most instances they afford those mucilaginous and elastic principles that contribute so largely to the support of vegetable life in greater proportions; such manures as are either wholly or in a great measure composed of them, must be the most beneficially employed, where quick and abundant supplies of nourishment are required, as in the growth of all the more gross and luxuriant crops, whether of grain, plants, or grasses; and that as those vegetable substances which contain saccharine, farinaceous, oily, saline, or mucilaginous principles in the largest quantities, are ascertained from experience to proceed the most readily into the state of dissolution or decay, and consequently to afford more fully and more expeditiously the nutrient food of new plants; where manures are principally formed from them, they should be preferred to such as have been made from the harder and more ligneous vegetable substances, that contain such properties in scarcely any, or much smaller degrees, for all the purposes of agriculture.

It is of great importance to take great care with regard to farm-yard dung, to mix it well together and store it in heaps; as it should neither be exposed to rain to wash away its nutritive qualities, nor to the rays of the sun or rough winds to exhaust them. Straw being the basis of this kind of manure, the farmer should carefully procure and preserve as much straw as he possibly can; and a proper preparation of manure, by a judicious mixture of the several bodies of which it is composed, will amply repay the farmer, as the prolific and nutritive qualities of the manure itself will by this means be much increased. Upon farms where the management of manure is well understood and practised, it is an important matter to have dunghills of all ages, and ready for use whenever the situation of a field calls for a restorative.

ON THE STUDY OF NATURAL HISTORY.

It is well to take every opportunity to extend a taste for the study of Natural History; for popular as it is, compared with former days, it does not yet inspire a general interest at all proportionate to its importance. Doubtless it is made the subject of lectures in many of the cities of our land; and we could not say that anything was wanting, if a taste for the results of study were all that is necessary to form. These are so brilliant and striking, that they cannot be set before the most unintellectual of men, without producing in them emotions of delight. But, unfortunately, a taste for such results is one thing, and a taste for the study is another; and out of the thousands who enjoy such displays of the treasures of science, there may not be one who is disposed to submit to the labour, self-denial, and sacrifice, which science requires of its disciples; neither have such displays any tendency to form that passionate love of truth—that thirst for searching and exploring—which bears men up in the laborious process by which discoveries are made. If we remember aright, Rousseau pointed out this error in education many years ago. It is forming a taste for having, where the object is to form the taste for earning; the former is mere indulgence, the latter is exertion. Such exertion gives health to the mind, while the enjoyment of which we speak soon becomes satiety, and in a short time, the power to enjoy is lost. The object of the present article, then, should be to show that there is pleasure, not only in knowing but in learning; and that every intelligent man will enjoy what he has learned by his own efforts, far more than that which is supplied to his hand. There is no doubt that the man who earns his bread by the sweat of his brow, enjoys it more than he who sits in luxurious repose, to be served by others; considering enjoyment alone, it is better to labour than to rest; but this is not the only circumstance to be regarded; there is another question, which tends most to confirm the health and vigour of the physical system, and to prepare it to resist the waste of time and the infirmity of declining years. So there is no doubt, that he who travels patiently over the field of natural science, enjoys his accessions of knowledge, far more than if he had them all spread out before him without any labour of his own; and, so far as respects the health and vigour of his mind, it is exceedingly important that he should deal more with processes than results, and find his happiness in the excitement of the race, and not the value of the prize.

It is not our object to show the student what he will find as he advances; this is left for him to discover; we would rather convince him that the pursuit itself, apart from the consideration of its success, will be its own reward. No evidence can be more convincing for this purpose than that of those veterans in the science, who have undertaken pilgrimages and encountered hardships in a spirit of deep devotion to the study; sustained in it, not by encouragement nor by applause, but by the self-rewarding principle, which ensures that services and sacrifices in a disinterested pursuit shall always be overpaid. It is not every one who will become a scientific naturalist; nor is this necessary; without mastering the details of science, men may become useful observers; and in this way, be able, without pretension and almost unconsciously, to secure improvement for themselves, and render service to the world. White of Selborne is a familiar example; he never pretended to be a scientific naturalist; his whole ambition was to furnish observations to those who would be able to arrange and use them; and yet, perhaps, there is no one who has done more to extend the taste for natural science than he. There was nothing in his situation peculiarly favourable to such pursuits; he had no more leisure to devote to them than most men may secure to themselves if they will. As to his field of observation, it was nature; the same nature which is spread out under every eye; and no man can say that the place where he dwells is barren, till he has ascertained by actual observation that it affords nothing to reward attention, or to inspire thoughtfulness in the mind. The frozen plains of the north, and the fiery regions of Africa, have rewarded investigation with treasures, which have been thought cheaply purchased, by encountering hardships and dangers; if so, it is not likely that any part of the inhabited world will be found, which does not merit, and will not reward the attention of observers. Since the number of scientific naturalists must be small, it is very desirable to form a class of observers, who may aid the cause of science without being able to make it the business of their lives.

But what good will the study of Natural History do? It is a fair question; and no general interest can ever be awakened in the pursuit, till it is answered to the satisfaction of those who ask it. At the same time this is no easy matter; since what will interest one mind to the full extent of its powers, may not be able to make the least impression on another. If any one after reading the Iliad, ask what good it will do, the proper answer would be, that it would do very little good to him.

Amid the forsaken works of man we feel solitary, because man is not there. Among the works of God we never feel so desolate, because he *is* there. We find this confirmed by the adventurers of the West; they have complained of loneliness only when in presence of men. So in the Arabian deserts, Châteaubriand found an intelligent young countryman of his own, who was so enchanted with their sublime solitudes, that he had given up his friends and his home. How powerfully this sentiment can sometimes act upon the heart, we see in one of the most striking of Park's adventures. He was in an African wilderness, far from any abodes of men, overcome with weariness, and alarmed by beasts of prey. He felt as if all was over with him, and was on the point of lying down in despair, when his eye rested on a little flower, blooming alone amidst the desert sands. It carried his thoughts upward at once to Him that made it. He asked himself if it were possible, that the Being who sustained that little flower in existence, could withdraw his presence from suffering man. He no longer felt helpless and alone; he went his way with new vigour, and soon reached a place of relief and repose. Had he felt deserted, he would in an hour have been torn by the beasts of the desert, and to this day his bones would have whitened in the sun.

So far from being an uncommon thing, the love of nature often manifests itself on a large scale with the intensity and power of the strongest passions. For in this, we take it, are we to look for an explanation of the mystery of that patriotic feeling, which has sometimes wrought so powerfully in the hearts of those who are absent from their native country. The love of country is founded in local attachment; it is found clinging to the scenery and natural objects of the father-land. No man ever forgets the tree that shaded the home of his childhood, nor the stream that ran near the door. When such objects are grand and striking, as in the mountains of Switzerland, they take firmer hold upon the memory; the images are more vivid, and the associations are proportionally strong. This was the case with the Hebrews; on the dry plains and beside the slow rivers of Babylon, they were haunted with the vision of the hills and valleys of their own romantic land. Such examples have been found in our own country, little as it may be credited by those who believe that human nature differs in different regions of the earth. Nor is this to be ascribed to the strength of domestic attachment; it is a more expansive feeling; it attaches itself not so much to the fireside, as to the "hills of our native country." The savage, who has little domestic happiness, is no stranger to its deep devotion; all his eloquence consists of images which shew that nature is before his mind; and there can be no doubt that the love of nature is one of the chief elements of that love of country which, in numberless memorable examples, has shewn itself able to bid defiance to the grave.

We have said so much—perhaps more than will be read—concerning the love of nature, because it is the cause and spring of all improvement in these studies; and if it exist so generally, it cannot be hard to inspire that interest in these pursuits, which they require and deserve.

But some may doubt whether this feeling, of which we have spoken, will accept the guidance of science, and submit to its restraints; whether it can be elevated from an imaginative sentiment into a steady and well-governed enthusiasm, such as improvement in science requires. On this point it can be easily shown, that wherever there is scientific zeal, it is invariably associated with a strong attachment for nature; and more than this, there are examples to show, that those who have made themselves illustrious in these pursuits, had their attention turned to the subject by the early love of nature. Linnæus himself is believed to have formed the taste which afterwards made him so illustrious, from his delight in the flowers of his father's garden.

There is another heresy of precisely the opposite description; it is the doubt whether science will not quench the love of nature; whether there is not a drudgery and cold exactness in science, which will destroy this animated feeling. It evidently had no such effect upon Linnæus. True; but it may be said, he persevered in the hope of glory; it may not be so with those who study for pleasure and improvement alone. This impression is founded on the precious maxim, that ignorance is the mother of devotion; and truly nature and religion both are little beholden to those who make this their creed. Perhaps it is not easy to explain the self-sustaining principle, which induces men to devote themselves to a favourite pursuit, and repays them for all their labours. But they can easily see its effects; they can see how soon a burning thirst for knowledge takes possession of their souls. There is no danger which they will not face; there is no hardship which they will not undergo, if it will enable them to solve those mysteries which, of all things, they desire to know. There was, no doubt, a dim magnificence in the imagination which an ancient Magian formed of the heavens; but could it compare in grandeur with the view of Newton, who looked through the system with the searching brightness of an archangel's eye? It would be hard indeed to believe, that we shall love nature less in proportion as we know it better.

It is not the love of nature, which refuses to be enlightened. It is a superstitious feeling, which would be more properly called the fear of nature. The Bramin, when the English officer showed him with his microscope that he must needs destroy life in eating, was miserable to find that he was always violating that Pythagorean law, which it was the glory of his life to observe. He should, however, have been grateful; for the information which he had thus gained, sorely against his will, might have opened his mind to the teaching of a better philosophy and a better religion. What can be the charm of error? Why so strong dislike of the revolutionary spirit of science, which restrains the power of the moon, disarms the stars of their malignant influences, strips the *ignis fatuus* of its terrors, and sends back the ghost to its grave? What satisfaction can there be in believing that serpents have power to fascinate, or that birds can foretell the destinies of men? There are many to this day, who are provoked to hear it denied that house sparrows change into snowbirds in the winter, or that the swallow, a bird of most untiring wing, instead of retreating before the storm, escapes it by diving into the mud. The true lover of nature is a lover of truth, and as Johnson said of Sir Thomas Brown, is willing to pay labour for it; though he may not manifest it precisely like that eminent man, who, "having heard a rumour of sympathetic needles by which, suspended over circular alphabets, distant friends or lovers might converse, procured two such alphabets, and placed them on the proper spindles. The result was, that when he moved one, the other, instead of taking by sympathy the same direction, stood like the pillars of Hercules!"

But it may be said, that, allowing there is no reason to expect to find men indifferent to these sciences, we see in point of fact, that they are so; not that they do not take pleasure in results, but there are few who give much attention to them, and hardly three or four in a nation who make them the business of their lives. But to say that these studies inspire no general interest, is only saying in other words that they are not generally known. Knowledge is the cure for indifference; that which one does not know, of course he does not care for; but as we grow acquainted with the subject, our interest is excited in one way or another. We may not like it more; if not, we shall dislike it more; our feeling will take decided forms, either of partiality or aversion. It is always found by experience, that the more one knows of these things, the more he will desire to know. The facts at first may seem few and meagre, and the reward unequal to the labour; but as we go on the field enlarges, and we begin to ask where nature can have hidden these surprising things, while the wonder is that we have not noticed these things which have lain close under our eyes. We have heard divines say, that in another world, the wonders of Providence will be unfolded to view. Another world? What world do they live in? At the moment while they are saying it, they are surrounded with unexplored and unsuspected wonders. Another world! Why, this becomes another world to the man who opens his eyes. Science breathes life and light into it; it kindles with glory, happiness, and praise; there is no one who cannot feel its inspirations if he will.

Some naturalists of the present day, as Linnæus did before them, complain that the science is not even held in reverence, and they hardly mention the subject without a reproof to those who treat it with levity and scorn. Something, however, must be forgiven to human nature. They must pardon a smile when the naturalist is descanting on the wonders of an insect's wing, for those who are guilty of this irreverence, only smile at the physical disproportion between his subject and himself, and they do not doubt that he has found something in it worthy the attention of enlightened minds. Are we to suppose that Franklin raising his kite, or Newton blowing his soap bubbles, was secure from this kind of martyrdom? Those who saw them thus employed, must have thought, to say the least, that the sages were engaged in very singular recreations. Naturalists sometimes bring ridicule upon themselves, by affecting a magnificence not called for by the occasion. Thus Kirby and Spence were so transported at witnessing the evolutions of a party of gnats upon the wing—their celestial dances, as they called them, in which they were "rising and falling, transparent and glorious"—that they could think of nothing but "angels and glorified spirits, drinking life and joy from the effulgence of divine favour." Is it a sin to smile at such lucubrations? Those able naturalists should have remembered, that for one instance in which such language would exalt a mortal's devotion to the skies, there would be hundreds in which it would be more likely to draw an angel's down.

But passing from these more general views of the subject, we will endeavour to direct attention to some of the purposes to which these studies should be applied.

First of all, to the purpose of improving the minds of the young; and a more important purpose we do not know. They should be instructed in Natural History, not because it may lead to something useful, but because, without looking to any other result, the mere pursuit is improving to the mind and heart. We will not contend for the pre-eminence of these studies. Every one, which brings the mind into action, will do good. But the great thing is to find such studies, as may bring the mind into willing and cheerful action; if they do not, the child may acquire that mechanical facility which often passes for real improvement, while it is, in fact, injurious to the intellectual powers. There are too many studies, which their minds play upon—perhaps work upon, while they are dealing all the time with words and not with things. "Words," it has been said, "are the daughters of earth; things are the sons of heaven;" but in many studies, the mortal claims and receives what belongs to the immortal. The observation of children needs to be cultivated more than the memory; the habit of remembering is in great part mechanical and easily brought to perfection; the habit of observing with the mind open as well as the eye, is not so easily formed; but it is so important to all kinds of success in later years, that the science which will do most to form it in the young, carries with it its own recommendation. We think that Natural History will be found, more than any other, to fasten itself upon the mind, and to give a cheerful excitement to all its powers. We have never seen anything more beautiful, than the desire of knowledge which the young sometimes discover; "the soft, dark, earnest eye," turned in breathless attention upon him who endeavours to instruct them. There is something fresh and animating in their view of the creation; they long to know everything within their sphere; the world seems enchanted; it awakens trains of thought and feeling, which, to them, are glorious and unbounded. As they grow older, this curiosity subsides; indifference grows and gains upon them, till, when they are men, they stand without interest amidst the beautiful and grand of nature, conscious of their ignorance, and yet not desiring to know. Verily, the doctrine that man must be born again, is philosophically as well as religiously true; he must renew the childhood of his soul, before he can ever desire to learn what it is shameful not to know. Restore him his childlike feelings, and his cold heart will kindle with new intellectual desires; he will burn to know the history of every thing—of every delicate flower on the earth, and every bright star in the sky; and when he sees the countless multitude of wonders that solicit his attention, he will begin to value the hope—perhaps we should call it something more than hope—that he may walk forever in the same path of knowledge, of light shining brighter and brighter, while he is travelling in this world below.

Children, then, are not only proper subjects, they are by far the best subjects of this kind of instruction. Instruction we call it, though it depends on themselves far more than others; these are pursuits in which the schoolmaster, whether abroad or at home, can do but little to aid them. The strong heart and active mind work out their own improvement, or nothing is done. They must, indeed, leave the schoolmaster within his narrow prison, and go out into the fields to strengthen their physical powers by exercise, and their minds by observation. It is not every study which will bear to be thus pursued; but those which will, afford a relief from the unnatural confinement which our systems of education impose on their disciples or victims. They supply that nervous impulse, without which, physiologists tell us, we may exercise for ever with very little advantage. We are not about to declaim concerning these systems; there may be some danger of their improving the intellectual at the expense of the physical powers. But it seems to us, that the greatest danger is, that they will improve neither; if the body loses strength, the mind will sympathize with it. In a great proportion of those cases, in which the young mind is thought to be making ruinous efforts, the mind is as inactive as the form. There is some easy play of memory which counterfeits mental exertion; or the look of lassitude passes for an intensely thoughtful expression. Though there are cases of disease in which the mind is preternaturally developed, in general it is true, that the mind cannot be improved, while the bodily powers stagnate and decay.

It is difficult to account for the manner in which these studies have been neglected in youthful education. It certainly is not owing to want of means and advantages; for no one is so situated that he cannot give them some attention. A residence in the country is, doubtless, most favourable; but we find more instances in the city than in the country, of those who pursue them with vigour and success. The truth is, that there are no disadvantages which resolution cannot overcome. When Sir Joseph Banks, with Dr. Solander, arrived at Rio de Janeiro, nothing doubting that he should enjoy the happiness of bringing to light the rich treasures of the country, the Portuguese authorities would not suffer any one of the party to land. This was sufficiently mortifying; but the naturalists having some live stock on board, bethought themselves that the jealousy of that enlightened country possibly might not extend to them; and under colour of procuring fodder for the animals, they received every day a collection of plants from the shore. A little money, judiciously applied, taught the purveyors to consult the taste of the botanists as well as of the cattle; and thus by this simple expedient, they were able to make a considerable collection of Brazilian plants, without setting their feet upon the soil of the country. Neither is it such men only who can do these things; it does not require the knowledge of a master to begin with; we know of the case of a female friend, who, during a long illness, employed herself in making a collection of English plants. An intelligent servant was sent out to collect them; feeble though she was, she examined and arranged them; and in this way passed years in happiness and improvement, which otherwise would have been entirely lost.

When these studies can thus be attended to under many disadvantages, it seems strange that, even if neglected in youthful education, they should not have formed a part of that process of self-education, which every cultivated mind passes through. The reason of their forming no part of youthful instruction is, that they do not appear to be an essential preparation for any business in life; a test which would, if followed out, put to flight many of those branches of learning that are most important to the interests of the mind. The meaning of it seems to be, that these studies are important, not to the merchant, the lawyer, the clergyman, the mechanic, but only to the *man*. And really one is tempted to ask, if the man is not to be regarded? Is there no such thing as improvement which cannot be estimated by the bearing it will have on our prosperity and success in life? Must not every one who has a heart and soul, acknowledge, that to strike out new sources of intellectual enjoyment—enjoyment which rests not in itself, but carries the soul onward and upward—enjoyment which is of itself improvement, is as great a service as can be rendered to man, considering him not as a being placed here to travel to the tomb, but as one who has a character to form, for an eternal existence? We have many false standards to cast away, before we shall be able to tell discerningly what objects in life we should most earnestly pursue.

PACKING ORCHARD AND OTHER FRUITS FOR CARRIAGE.

In packing fruit to be sent to a considerable distance, great care is requisite. It should not be packed in baskets, as they are liable to be bruised among heavy luggage, and the fruit, of course, will be injured. We recommend boxes made of strong deal, of different sizes, according to the quantity of fruit to be packed. These boxes should be made of inch deal, and well secured with three iron clamps at each corner, and two small iron handles, one at each end, to fasten them to the roof of the coach.

In packing these boxes proceed thus:—First, put a layer of fine long dry moss in the bottom of the box, then a layer of currants or cherries, then another layer of moss, and so on, alternately, fruit and moss, until the box is so full that, when the lid is hasped down, the fruit may be so firmly packed, as to preserve them from friction. Make a layer of fine moss and short, soft, dry grass, well mixed, in the bottom of the deal box; then pack in the melons with some of the same, packing it tight in between all the rows, and also between the melons in the same row, till you have finished the layer; choosing the fruit as nearly of size as possible, filling up every interstice with the moss and grass. When the melons are packed, lay a thin layer of moss and grass over them, upon which place the box with the currants, packing it firmly all round with moss to prevent it from shaking; then put a thin layer of moss over the box, and pack the pears firmly (but so as not to bruise them) on that layer, in the same manner as the melons; and so on with the peaches, nectarines, plums, and, lastly, the grapes, filling up the box with moss, that the lid may shut down so tight as to prevent any friction among the fruit. The boxes should have locks, and two keys, which may serve for them all; each of the persons who pack and unpack the fruit having a key. The moss and grass should always be returned in the boxes, which, with a little addition, will serve the whole season, being shaken up and well aired after each journey, and keeping it sweet and clean. After the wooden box is locked it will be necessary to cord it firmly. Cotton may be substituted for moss, as it is very cheap; more especially if it be returned with the packages, so as to be re-used, which it can be for a much greater number of times than moss.

CELERY.

THE *celery* is a hardy biennial plant, a native of Britain, and known in its wild state by the name of smallage. It is frequent by the sides of ditches, and near the sea, where it rises with wedge-shaped leaves, and a furrowed stalk, producing greenish flowers in August. The whole plant has a rank coarse taste, and the effects of cultivation in producing from it the mild sweet stalks of celery are not a little remarkable.

The blanched leaf-stalks are used raw, as a salad, from August till March; they are also stewed, and put in soups. In Italy the unblanched leaves are used for soups; and when neither the blanched nor the green leaves can be had, the seeds, bruised, form a good substitute. The root only of the variety called the celeriac is used, chiefly in soup.

The varieties are—

1. The early red solid.
2. The white solid.
3. North's upright, or Italian; decidedly the best variety in cultivation.
4. The turnip-rooted, or celeriac, the *celeri-rave* of the French, and the *knott-sellerie* of the Germans. This is hardier than the other kinds, and will continue longer in spring. It is grown to a large size in the neighbourhood of Hamburgh, and sometimes imported for the London market.

The first two sorts are preferable for general culture. The red variety is rather coarse for salads, but it is hardy to stand the winter, and well adapted for soups and stews. The turnip-rooted is cultivated on account of its root, which is fit for use in September and October, and may be preserved in sand through the winter.

All the sorts are raised from seed; and half an ounce is reckoned sufficient for a seed-bed four feet and a half wide by ten feet in length, of the upright sorts; but for celeriac, a quarter of an ounce will be enough for a bed four feet square.

THE MEDLAR

THE *medlar* is a small or middle-sized branching tree; the branches woolly, and covered with an ash-coloured bark, and, in a wild state, armed with stiff spines. Leaves oval-lanceolate, serrate, towards the point somewhat woolly, on very short channelled petioles. Flowers produced on small natural spurs, at the ends and sides of the branches. Bracte as long as the corolla; calyxes terminating, fleshy; petals, white; fruit, a turbinated berry, crowned with five calycine leaflets; pulp thick, mixed with callose granules, and containing five gibbous wrinkled stones. The tree flowers in June and July, and the fruit is ripe in November. It is a native of the south of Europe; but appears to be naturalized in some parts of England, where it has been sown in copses by birds.

The fruit is eaten raw in a state of incipient decay; its taste and flavour are peculiar, and by some much esteemed.

The varieties are—

1. The Dutch medlar; a crooked, deformed, low tree, with very large leaves, entire, and downy on the under side. The flowers and fruit are very large; the latter approaching to the shape of an apple.
2. The Nottingham medlar; with fruit of a quicker and more poignant taste.
3. The stoneless medlar; with small obovate fruit without stones or seeds. The fruit is not so good as that of the others; but keeps longer.
4. The wild medlar; a smaller tree, with smaller leaves, flowers, and fruit, than any of the former sorts, and the fruit is pear-shaped.

This tree is propagated by seeds, by layers, and cuttings, or by grafting on seedlings of their own species, or on any other species of *Méspilus*, or of *Cydònia*, or *Cratægus*. Miller observes, that if the stones are taken out of the fruit as soon as it is ripe, and immediately planted, they will come up next spring, and make good plants in two years. He prefers raising from seed to grafting on the Cratægus. Forsyth says, "those who wish to keep the sorts true, should propagate them by grafting on their own stocks." The plant is rather difficult to strike by cuttings.

The soil in which the medlar thrives best is a loamy rich earth, rather moist than dry; but not on a wet bottom.

Forsyth recommends the same sort of treatment in pruning this tree as that in use for the quince. Cut out all the dead and cankery wood, and keep the tree thin of branches when it is desired to have large fruit. Care is requisite to train standards with tall stems. Espaliers will require a summer and winter pruning, as in the apple-tree.

THE ORACHE, OR MOUNTAIN SPINACH.

THE *Orache* is a hardy annual, a native of Tartary, and introduced in 1548. The stem rises three or four feet high: the leaves are oblong, variously shaped, and cut at the edges, thick, pale green, and glaucous, and of a slightly acid flavour. It produces flowers, of the colour of the foliage, in July and August. There are several varieties, but the two principal are the white or pale green, and the red or purple-leaved.

The leaves of this are used as spinach, and sometimes also the tender stalks. The stalks are good only while the plant is young: but the larger leaves may be picked off in succession throughout the season, leaving the stalks and smaller leaves untouched, by which the latter will increase in size. The spinach thus procured is very tender, and much esteemed in France.

The orache is raised from seeds, which may be sown early in spring, in drills two feet apart—the plants being afterwards thinned out, till they are two feet distant in the rows. A second sowing, made about the middle of June, will ensure a succession of leaves; but the size and succulency of these will of course depend a good deal on the richness and moisture of the soil.

Leave a few plants of the most tender and succulent constitutions to blossom, and they will produce abundance of seeds in August.

THE JERUSALEM ARTICHOKE.

The *Jerusalem Artichoke* is a hardy perennial, a native of Brazil, and introduced in 1617. It has the habit of a common sunflower, but grows much taller, often rising ten or twelve feet high. The season of its flowering is September and October; but though its roots endure our hardest winters, the plant seldom flowers with us, and it never ripens its seed. The roots are creeping, and are furnished with many red tubers, clustered together, perhaps from thirty to fifty to a plant. To cause it to flower, these tubers should be removed as soon as formed, so as to throw the strength, which would otherwise be employed on them, into the stem, on the principle mentioned. Before potatoes were known, this plant was much esteemed. The epithet Jerusalem is a mere corruption of the Italian word *girasole*, (from *girare*, to turn, and *sol*,) or sunflower; the name Artichoke is bestowed, from the resemblance in flavour which the tubers have to artichoke bottoms.

The roots are esteemed a wholesome, nutritious food, and are eaten boiled, mashed with butter, or baked in pies, and have an excellent flavour. Planted in rows, from east to west, the upright herb of the plant affords a salutary shade to such culinary vegetables as require it, in the midsummer months, as lettuce, turnips, strawberries, &c.

It is raised by planting, either some small offset tubers of the main roots, or middling-sized roots cut into pieces for sets, which is more eligible. Preserve one or two full eyes to each cutting.

It will grow in any spare ordinary part of the garden; but to obtain fine large roots, give it an open compartment of pretty good mellow ground. The season for planting is February, March, or beginning of April. Having dug the compartment, plant them, either by dibble, in rows, two feet and a half asunder, about eighteen inches in the lines, and three or four inches deep; or, in drills, by a hoe, the same depth and distances. The plants will come up in April and May. In their advancing growth, hoe and cut down all weeds, drawing a little earth to the bottom of the stems. The root will multiply into a progeny of tubers, in a cluster, in each plant, increasing in size till September and October; you may then cut away the stems, and dig up the produce, as wanted. Or, in November, when they are wholly done growing, it will be proper to take up a quantity, and lay in dry sand, under cover, to be ready as wanting, in frosty weather, when the others are frozen up in the ground, or affected by the frost. As the roots of this plant are very prolific, the smallest piece of a tuber will grow. In taking up the produce, you should therefore clear all out as well as possible, as any remaining part will come up the following year disorderly, and pester the ground; and would thus continue rising for many years, but not eligible to cultivate for a good crop. Therefore, to answer a demand, make a fresh plantation every year.

RED BEET.

The *Red Beet* is a biennial plant, rising with large oblong, thick, and succulent leaves, generally of a reddish or purple colour; the roots often three or four inches in diameter, of a foot or more in length, and of a deep-red colour. It produces greenish flowers, in August. The red beet is a native of the sea-coast of the south of Europe; it was cultivated in this country by Tradescant, the younger, in 1656, and then called *beet rave*, (or beet-radish,) from the French name *betterave*. The field beet, or mangold-würzel, is supposed to be a hybrid, between the red beet and the white species, which is of caous plant.

The roots of the red beet are boiled and sliced, and eaten cold, either by themselves, or in salads; they also form a beautiful garnish, and are very much used as a pickle. Dried and ground, they are sometimes used as "a supplement to coffee." Dried in an oven, in thin slices, they are also used in confectionary.

The varieties are numerous, but the following may be considered the principal:—

Large-rooted—Betterave rouge grosse.

Long-rooted.

Dwarf—one of the best.

Turnip-rooted—an early variety; Betterave rouge rond précoce.

Small-red—Petite betterave rouge.

Castlenaudari—much esteemed in France, and said to have the flavour of a nut; Betterave rouge de Castlenaudari.

Green-topped—much grown in Scotland.

There are also some yellow-rooted sorts, none of which are in general cultivation in gardens.

DESCRIPTION OF THE PLATES.

TURNERA ULMIFOLIA.

ELM-LEAVED TURNERA.

Pentandria Trigynia.

Portulaceæ.

Gen. Char.—Calyx five-cleft, infundibuliform; the outer two-leaved; petals 5, inserted in the calyx; stigmas many-cleft; capsules one-celled, many-valved.

Spec. Char.—Flowers sessile; leaves oblong, acute, serrate, pubescent, with two glands at base.

Stem shrubby, eight or ten feet high, sending out branches on every side the whole length. Leaves ovate-lanceolate, two inches and a half long, and an inch and a half broad, rough on their upper side, and of a lurid green; their under side has many strong veins, and is of a lighter green: the edges are serrate. The flowers sit close upon the footstalks of the leaves, having two pretty large leafy appendages to the calyx. The corolla is large and of a bright yellow. Capsule superior, ovate, pubescent, opening from the top to the middle in three parts. Seeds slightly curved inwards, chestnut brown.

It is a native of the West Indies, and is commonly cultivated in our stoves, where it rises with a semi-shrubby stalk, to the height of several feet, seldom continuing more than two or three years; young plants generally come up in plenty from seeds spontaneously scattered, so that a succession is easily obtained.

It flowers from June to August. Its foliage has a disagreeable smell when bruised; its flowers are showy, but of short duration, and are remarkable for growing out of the footstalk of the leaf.

ARTEMISIA SAUTONICA.

TARTARIAN SOUTHERN-WOOD.

Syngenesia Polygamia Superflua.

Compositæ.

Gen. Char.—Receptacle either naked or hairy; seed-down none; calyx imbricated, with roundish converging scales; florets of the radicle subulate, entire.

Spec. Char.—Stem-leaves pinnate, linear, multifid. Branches undivided; spikes one-ranked, reflexed; flowers with five florets.

The root is perennial and woody. The stem is two feet high or more, round, panicled, erect, and somewhat hoary. The leaves on the upper part of the stem and branches are small, sessile, and linear, of a pale green colour above, and hoary beneath. The flowers are roundish, pale brown, solitary, and placed in alternate spikes or racemes upon short footstalks, and are all directed the same way. In the fruiting plant the branches are erect, and lose their hoariness. The common calyx is composed of numerous narrow imbricated scales. The florets of the disk are hermaphrodite; those of the radius female. The receptacle is naked.

This species very much resembles common wormwood in its chemical and sensible qualities. It has a strong disagreeable odour, and when chewed, first warms the tongue, and then leaves a sensation of cold. The seeds are brought from the Levant (of which it is a native), and sold under the name of worm seed.

It is of the very easiest culture, but like other species of the genus, dislikes a wet soil.

VERBASCUM MYCONI.

BORAGE-LEAVED MULLEIN.
Pentandria Monogynia.
Solaneæ.

Gen. Char.—Corolla rotate; capsule one-celled, two-valved.
Spec. Char.—Leaves hoary, radical; scape short, naked.

Root perennial, composed of slender fibres. The leaves, which spread flat on the ground, are of a thick fleshy substance, of an ovate shape, indented on their edges, woolly, and of a dark green colour; they are sessile, embrace the crown of the root, and lie over each other; they continue in verdure all the year, but in winter change to a much darker green. From among these leaves arise several scapes or naked slender stalks, about four inches high, which divide into three or four pedicels at the top, hairy, and of a brown purplish colour, each sustaining one large flower, of a fine violet, so deeply divided as to appear to be five-petalled. Calyx funnel-shaped, cut into five obtuse segments. Filaments thick, erect. Anthers flat. Capsule oblong, ovate.

The flowers, which are highly ornamental, make their appearance in May, and continue successively in blossom for several months; hence it becomes a desirable plant to cultivate, especially for the decorating of rock-work; it is very hardy, requires a north aspect in the summer, and to be carefully watered in dry weather; will grow in almost any soil, and is usually propagated by planting its roots in autumn.

HERMINIUM MONORCHIS.

MUSK HERMINIUM.
Gynandria Monandria.
Orchideæ.

Gen. Char.—Flower somewhat spreading; lip without a spur; glands of the pollen masses naked, distinct.
Spec. Char.—The radical leaves lanceolate, twin.

Root formed of two roundish tubers, one sessile, of the present year, the other smaller, pedunculated, for the following year. Stem about a hand's-breadth in height, erect, rounded, nearly naked. Leaves radical, one-two keeled, rather obtuse. Flowers numerous, small, yellow-green, drooping, disposed in a dense elongated spike. Bracteas lanceolate, subulate, green, shorter than the germen. Perianth six-partite. Column of fructification very short. Anther terminal, persistent, ovate, rotundate, green, two-celled, with the cells distinct at the base. Pollen masses ovate, fulvous, granulated, shortly pedicilate, with the glands rather large, ovate, naked. Germen oblong, furrowed. Stigma concave.

The plants which belong to the *Orchis* tribe are almost universal favourites; and the very pretty and delicate flower here figured, is a native, like so many of the same tribe, of dry, chalky, or even gravelly pastures, and in such situations is not uncommonly to be met with in many of the counties of England.

The *Herminium Monorchis* has rather a powerful smell. This is by many thought to resemble the scent of musk, by others to have a much greater affinity to that of honey.

Most of the tuberous-rooted individuals of the *Orchis* family, may be seen to present the tubers (of the present and the succeeding year), of pretty nearly equal dimensions. In the plant in question, this is not the case; for while the tuber which affords nourishment to the existing stem is shrivelled, sessile, and large, the other is seen forming a little swelling at the extremity of a rather stout and long horizontal fibre. The future year's plant will thus thrive at some considerable distance from its parent, and no two, therefore, so produced, can spring up in the same spot.

LONICERA SEMPERVIENS.

CAROLINA TRUMPET HONEY-SUCKLE.
Pentandria Monogynia.
Caprifoliæ.

Gen. Char.—Corolla one-petalled, irregular; berry two-celled, many-seeded.
Spec. Char.—Spikes terminal; leaves oblong.

The shoots are weak, of a purplish red colour, and smooth. The leaves closely surround the stalk; of a lucid green on their upper side, but pale on their under. The flowers are produced in bunches; they have long slender tubes, which are enlarged at the top, when they are cut into six almost equal segments. The outside of the flower is of a bright scarlet, and the inside yellow, inimitable by art, especially over a black engraving.

It is too tender to bear the inclemency of our winters, if they happen to be at all severe; and therefore, when treated as a hardy shrub, it is generally soon lost. It is a good climber for the conservatory, and its beauty renders it worthy of such a situation. Flowers most part of the summer. Propagated by cuttings.

PRIMULA SCOTICA.

SCOTCH PRIMROSE.
Pentandria Monogynia.
Primulaceæ.

Gen. Char.—Capsule one-celled; stigma globose.
Spec. Char.—Corolla hypocrateriform; the tube cylindrical, its orifice naked; stigma capitate; capsule one-celled, opening with ten teeth.

Root perennial, somewhat thick, fibrous. Leaves all proceeding from the root, obovate, of a dull green, veined, sprinkled all over, especially beneath, with a yellow mealiness. Scape from six to eight inches high, erect, stout, rounded, glabrous, remarkably farinose. Flowers in an umbel, erect. Peduncles short, mealy, supported at their base by a small subovate bractea. Calyx five-toothed, mealy, ovate, the teeth obtuse, erect. Corolla hypocrateriform, longer than the tube of the calyx, cylindrical, farinose, five-lobed. The segments very patent, of a purplish violet colour, bifid at the extremity. Stamens 5, within the mouth of the corolla. Filaments very short. Anthers oblong, yellow. Germen roundish, somewhat five-lobed. Style filiform, striated. Stigma five-lobed, the lobes very small.

This species has been lately discovered in Scotland, and is of very low growth, not exceeding two inches in height, and having about six flowers on each stem. It may be cultivated very well in a small pot in light loamy earth, and needs no protection. It seems not to increase very freely, as it is seldom that it produces any offsets; the best time for separating these is in the spring.

MESEMBRYANTHEMUM MICANS.

GLITTERING FIG-MARIGOLD.
Icosandria Pentagynia.
Ficoideæ.

Gen. Char.—Calyx five-cleft; petals many, linear; capsule turbinate, fleshy, inferior, many-seeded.
Spec. Char.—Leaves half cylindrical, obtuse, sub-recurved, much sparkling; sepals and petals sub-acute.

The *Mesembryanthemum micans*, so called from the glittering particles which are conspicuous on its stalks and leaves, is a species which has long been introduced to our gardens for the beauty of its flowers, which, in richness of colour, are indeed surpassed by few: they are produced in the months of July and August, but do not expand fully unless the sun shines powerfully on them; nor do they long retain that regular expansion observable in some species, but quickly assume a somewhat ragged appearance; nevertheless, upon the whole, it is one of those species which is highly deserving of culture, by those who are partial to this tribe of plants.

It is a native of the Cape, and readily propagated by cuttings.

RHEUM PALMATUM.

PALMATED RHUBARB.
Enneandria Trigynia.
Polygoneæ.

Gen. Char.—Calyx 0; corolla six-cleft, persistent; seed 1, three-sided.
Spec. Char.—Leaves palmate, pointed, roughish, the sinus

dilated at the base; stalks obsoletely furrowed above, and rounded at the edge.

The palmated rhubarb is a native of Russia, and some parts of Asia, whence the dried root is imported into this country for medicinal purposes. It is sufficiently discriminated by the specific characters, and is besides so well known, as to render a minute description unnecessary. The root is large, thick, oval, branched, brown externally, and of a deep yellow colour within. The stem is erect, round, hollow, jointed, branched at top, and rises to the height of six or eight feet. The lower leaves are very large, palmated, acuminate, somewhat rugged, and stand upon long-channelled smooth petioles, grooved above, and rounded at the edge with ferruginous dots; those of the stem are placed close to the stalk, and become gradually smaller towards the summit. The flowers, which appear in May and June, are small, white, numerous, surrounding the stem, and collected at the extremity of the branches, forming a sort of spike. The corolla is divided into six obtuse segments; the filaments are nine, the length of the corolla, and supporting oblong anthers; the style is short, with three reflected stigmas. The germen becomes a triangular seed, acute, with membranaceous margins.

Since the introduction of *R. palmatum*, it has been largely cultivated in this country; and we are informed by the best authority, that the London market is principally supplied from Banbury. Fine specimens are worth about six shillings per pound, and resemble Turkey rhubarb in their appearance more than they do East India; although it is for the latter that they are principally substituted. The article sold at the herb shops under the designation, "English Rhubarb," is the produce of the *R. undulatum;* the stalks of which are used for tarts. It may be bought for ninepence per pound, and from its want of power has caused undeserved reproach to be cast on the proper cultivated sort.

Twenty pounds of English Rhubarb,
Seven pounds of East Indian,
Three pounds of Turkey,

ground together, are the proportions employed by one of the most fashionable druggists at the West-end of the Town, to form a fine looking article, denominated by them, and sold as, "Fine Turkey Rhubarb." The Society for the Encouragement of Arts, Manufactures, and Commerce, exerted itself for many years to promote the culture of Rhubarb in this country; and medals and other rewards were voted to Sir A. Dick, Mr. Jarman, Mr. R. Davis, Jun. of Minehead, Mr. Ball, of Williton, Mr. Jones, late of Fish Street Hill, &c.

Mr. Davis recommends the seeds to be sown in a very gentle hot-bed, in March, and when the roots are about the size of a crow's quill, they should be drawn up carefully to preserve the taproot, and planted in a fine rich earth in a deep soil; if the weather should prove dry, they must be watered. When the plants are once in a growing state, all farther care and trouble are at an end, but that of keeping them free from weeds. The distance of the plants should be eight feet; and *as they disappear above seven months in the year*, the ground may be usefully employed in many articles of gardening, from the middle of August to the beginning of April.

The seeds, however, do not require a hot-bed to make them vegetate, but if sown in the natural ground during the spring, when the weather is open, soon come up and thrive fast. The plant delights most in a rich, light, deep soil, and warm exposure, but will thrive almost in any situation.

Mr. Jones's method:—

"Sow the seeds in March and April, or during the autumn, in August and September; the former to be transplanted in autumn, the latter in spring. Instead of placing the seedling plants where they are to remain, as is usually recommended, beds should be prepared resembling those which are made for asparagus, of fine mould, from twelve to eighteen inches deep. When the young plants are four or five inches high, and have brown out as many leaves, transplant them upon those beds at eight inches asunder; selecting, first, the largest, carefully drawing them out, so as to destroy or even disturb the fibres as little as possible. Watering the bed previously to the removal, will greatly facilitate the operation.

"In the culture of rhubarb, the whole difficulty consists in bringing the plants through their first season; if the weather be hot and sultry they must be shaded, and at all events must be continually watered. For transplanting, a wet or cloudy day should be preferred; and if the weather should continue for two or three days successively, not more than four or five in a hundred will probably be lost. In a month the roots will have made fresh shoots, and new leaves will have succeeded the former, which commonly, notwithstanding all our care, will wither away. The plants may now remain till the ensuing spring, or if the summer be favourable, and the land intended for the plantation be well trenched three feet deep, it may be completed without delay. It is a good way to sow the ground with carrots: the surface by this means being preserved from weeds, and rendered finer by repeated hoeings, and the bottom kept light and open. At different periods during the summer, when the plants are of a proper size, and the weather is cloudy or showery, with a transplanter or circular spade, remove them with a ball of earth adhering, at the prescribed distances, into the midst of the carrots, destroying such as might obstruct the growth of the rhubarb; and if the weather should prove unusually hot, the foliage of the carrots will preserve the young plants from the sun till they have acquired a sufficient growth; after this it remains only to keep the plantation clear, and the trenches open.

"In the choice of situation the aspect is not very material, provided it be not shaded too much on the south or west. The indispensable points are the depth and quality of the soil, which should be light, loamy, and rich, but not too much so, lest the roots should be too fibrous: it can scarcely be too dry, for more evil is to be expected from a superabundancy of moisture, than from any actual want of it. A declivity is very eligible for the plantation. When a plantation does not possess this material advantage, narrow beds and deepened trenches are among the artificial means that should be adopted; but most situations will require some care to prevent the ill effects of water remaining on the crowns of the plants: therefore, when the seed-stalks are cut off, which ought always to be done on the withering of the radical leaves; they should be covered with mould in the form of a hillock. This will answer two good purposes, that of throwing off the rain, and keeping open the trenches, by taking the earth from them."

VIOLA ODORATA.

SWEET VIOLET.

Pentandria Monogynia.
Violaceæ.

Gen. Char.—Calyx 5-cleft; corolla 5-petalled, irregular, the upper petal spurred at the base; anthers cohering; capsule 3-valved, 1-celled.

Spec. Char.—Stem none; Sycons creeping; Leaves cordate, smooth, as well as the footstalks; Calyx obtuse.

It is a common indigenous plant, growing in most parts of our island, and universally esteemed for the beauty of its flowers, and the sweetness of their scent. It is most frequently found in woods, and moist banks; but a variety, with double flowers, is chiefly cultivated for medicinal purposes.

The plant has no stem, but it increases by runners, which throw out many fibrous radicles, and sends up leaves in tufts. The leaves are heart-shaped, serrated, smoothed above, somewhat wrinkled, petioled, and of a dark green colour. The flowers which appear in March, stand upon smooth channelled foot-stalks, taller than the leaves, bearing above their middle a pair of small lanceolate bracteas. The calyx consists of five oblong acute leaves. The flowers are drooping, deep purplish blue, and pale in the mouth; the corolla consists of five unequal petals; the two lateral ones are opposite and bearded near the base, the posterior is slightly keeled and has a horned nectarium; the stamens are five, nearly sessile, and terminate in a membranous expansion that covers the upper part of the germen, which is roundish, with a falcated pistil.

The violet is a native of every part of Europe, and Desfontaines says, that it is common in Barbary, in the palm groves, where the blue and white grow promiscuously, and flower in the winter. Hasselquist found it in Palestine and Japan, and Laureiro saw it in China, near Canton. It has always been a favourite with poets; and were we to indulge in quotations, we could fill several pages with their inspirations. We shall merely make one or two extracts:—

> "There was a mark on Laïs' swan-like breast,
> (A purple flower with its leaf of green,)
> Like that the Italian saw when on the rest
> He stole of the unconscious Imogene,
> And bore away the dark fallacious test
> Of what was not, although it might have been,
> And much perplexed Leonatus Posthumus;
> In truth it might have puzzled one of us.
>
> "The king told Gyges of the purple flower;
> (It chanced to be the flower the boy liked most;)
> It has a scent as though love, for its dower,
> Had on it all his odorous arrows tost;
> For though the rose has more perfuming power,
> The violet (haply 'cause 'tis almost lost,
> And takes us much more trouble to discover,)
> Stands first with most, but always with a lover."
>
> *Barry Cornwall.*

> ———————— "Where to pry aloof,
> Atween the pillars of the sylvan roof,
> Would be to find where violet beds were nestling,
> And where the bee with cowslip-bells was wrestling."
>
> "Gay villagers upon a morn of May,
> When they have tired their gentle limbs with play,
> And formed a snowy circle on the grass,
> And placed in midst of all that lovely lass
> Who chosen is their queen:—with her fine head
> Crowned with flowers, purple, white, and red:
> For there the lily and the musk-rose sighing,
> Are emblems true of hapless lovers dying:
> Between her breasts that never yet felt trouble,
> A bunch of violets, full-blown, and double,
> Serenely sleep."
>
> *Keats.*

The odour of violets is particularly pleasant, but they are somewhat bitter to the taste. They yield their colour and flavour to boiling water. It is said, that the sherbet that is most esteemed by the Turks, and which is drank by the Grand Signor himself, is made of violets and sugar. The petals were formerly used as a laxative.

IRIS MARTINICENSIS.

MARTINICO IRIS.

Triandria Monogynia.

Irideæ.

Gen. Char.—Flowers six-parted, every other division reflexed; stigmas shaped like petals.

Spec. Char.—Beardless; leaves linear; petals with glandular spots; ovaries three-cornered.

Root solid, sub-bulbose, surrounded by whitish fibres, and throwing out other tubers. Stem upright, roundish, two feet high, simple. Root-leaves recuminate, quite entire, somewhat rigid, distinct, flat, keeled at the base, above simple, form upright, spreading, few. Flowers few, coming out successively from the same spathe, yellow, without scent, peduncled. The petals have a black, shining, glandular hole or pit, like that which is common to several species of ranunculus.

This species is a native of the West Indies; and is more remarkable for the curious structure, than the beauty of its flowers.

It is usually kept in the stove, plunged in the tan, where it flowers in May and June, and for the most part ripens its seeds, by which it is readily increased.

OXYBAPHUS VISCOSUS.

VISCID UMBRELLA-WORT.

Triandria Monogynia.

Nyctagineæ.

Gen. Char.—Calyx five-fid, campanulate; corolla infundibuliform.

Spec. Char.—Flowers racemose; leaves cordate, orbiculate, acute, tomentose.

The present is one of those plants which is entitled to our admiration, for its curious and singular structure, rather than for any extraordinary figure it makes in a collection; not that its flowers are without a certain share of beauty.

It is an annual, growing to about the height of two feet; the whole plant is viscous, and, if bruised, smells somewhat disagreeably; the flowers do not open at any particular time as those of the *Mirabilis* do, and each contains only three stamina; when they fall off, which they do soon after expanding, the calyx closes on the germen, enlarges, droops, and becomes deeply plaited; on the ripening of the seed it turns brown, expands, and is suspended like a little umbrella over the seed, which when perfectly ripe drops out on the ground; the expanded calyx in this state appears somewhat like the flower of a Physalis.

This plant flowers from June to October, and ripens its seeds in the open air; it is not difficult of culture, and requires the same treatment as other tender annuals from Peru.

MATURRHIA INCISA.

CUT-LEAVED MATURRHIA.

Pentandria Pentogynia.

Tiliaceæ.

Gen. Char.—Calyx five-toothed; capsule five-celled.

Spec. Char.—Stem hispid; leaves lanceolate, cut; stipules entire.

The stalks to the naked eye discover a manifest roughness; a magnifying glass shews this roughness to be of a singular kind, that they are beset on every side with little protuberances, from whence issue tufts of pellucid hairs, and here and there a single hair is discoverable with a small red viscid globule at its extremity; a portion of the stalk, when highly magnified, somewhat resembles that of the creeping Cereus. The leaves, which are not so manifestly hairy as the stalk and calyxes, are deeply jagged on the edges, and bear some little affinity in their appearance to those of the *Pelargonium tricolor*. The flowers, when in bud, are of the richest crimsom imaginable; as they open they incline to a deep orange, and finally become of a yellowish hue.

As this beautiful species produce abundance of blossoms, they may be seen in all their states during most of the summer and autumnal months. It is propagated by cuttings.

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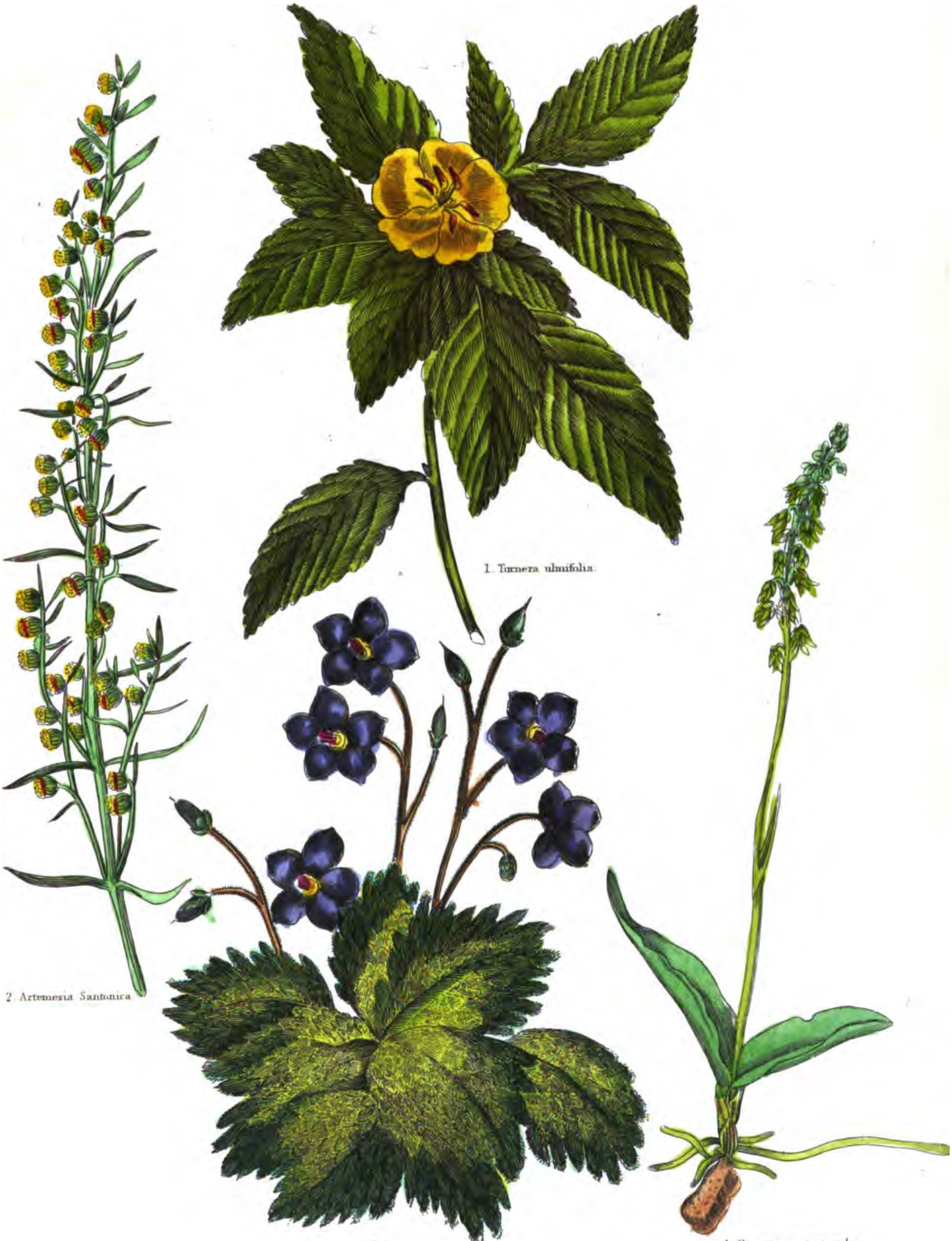
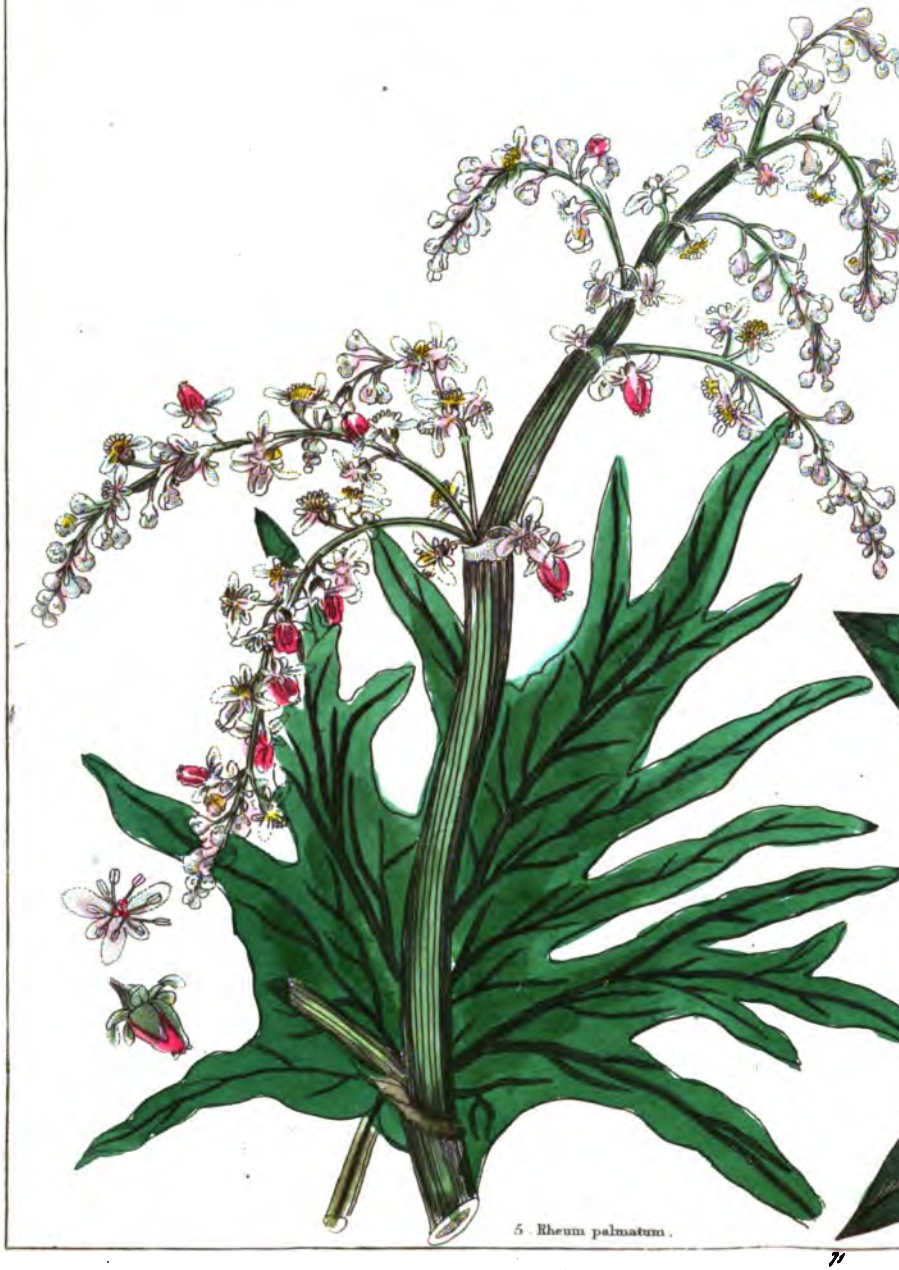


1. Turnera ulmifolia.

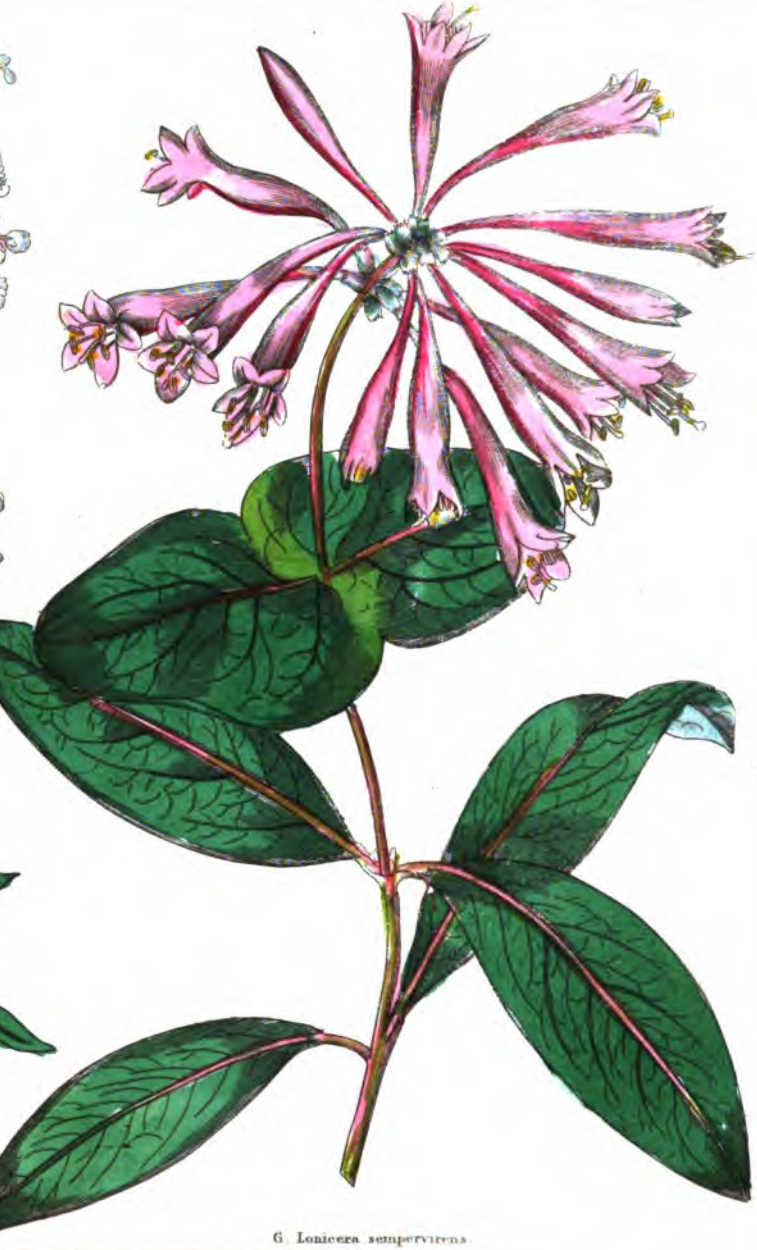
2. Artemesia Santonica.

3. Verbascum myconi.

4. Herminium monorchis.



5. Rheum palmatum.



6. Lonicera sempervirens.

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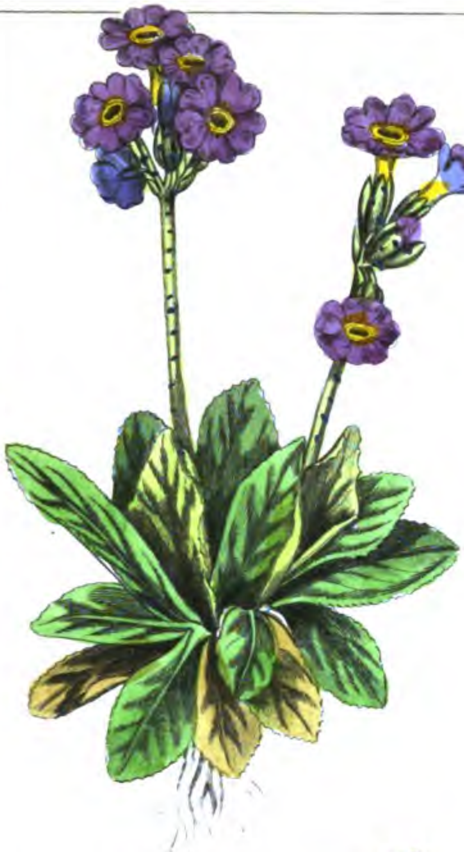
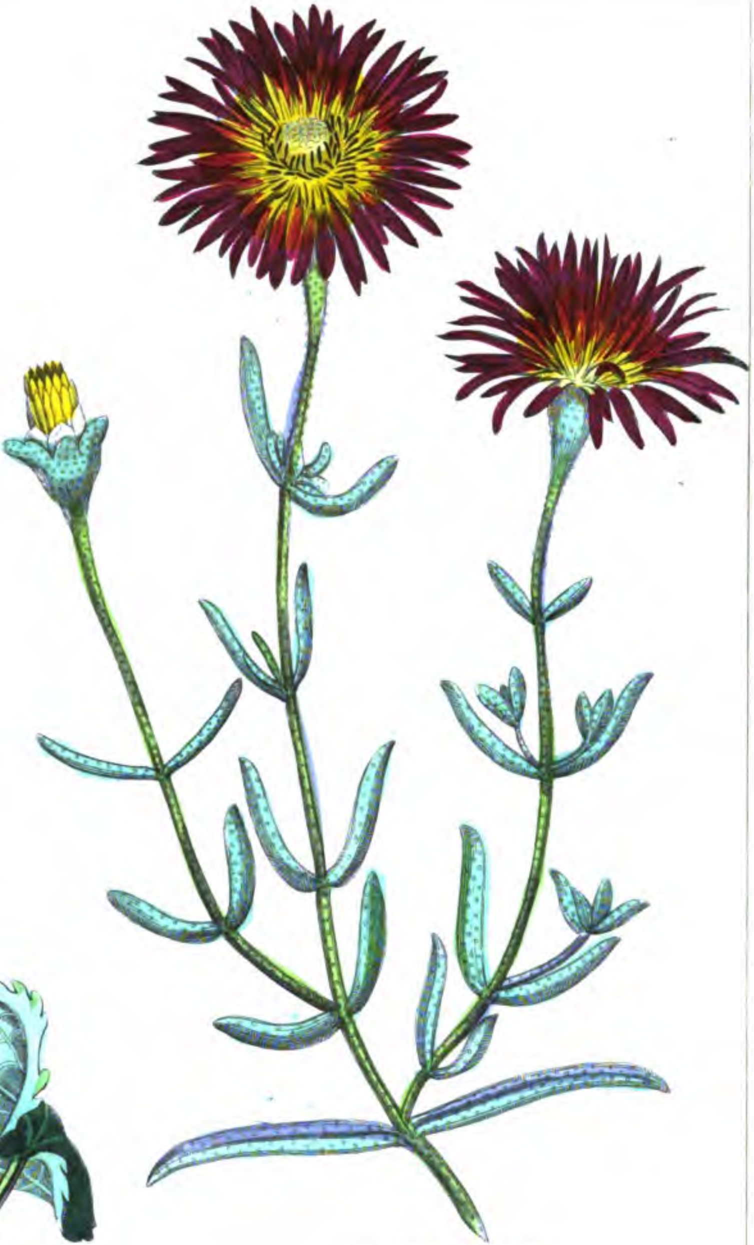
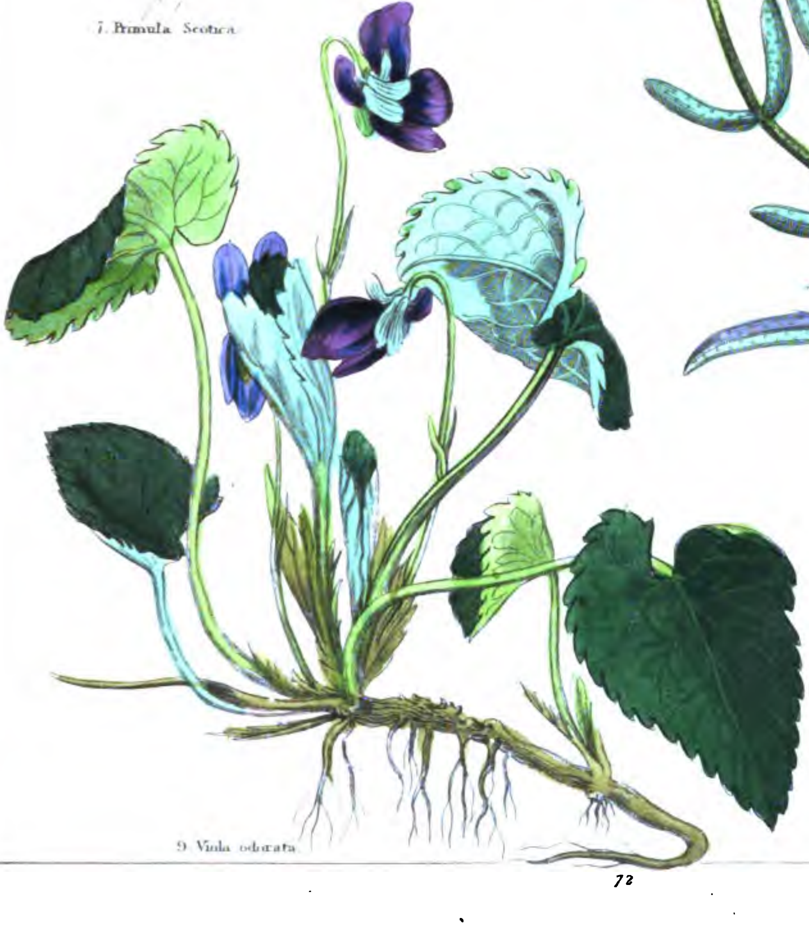


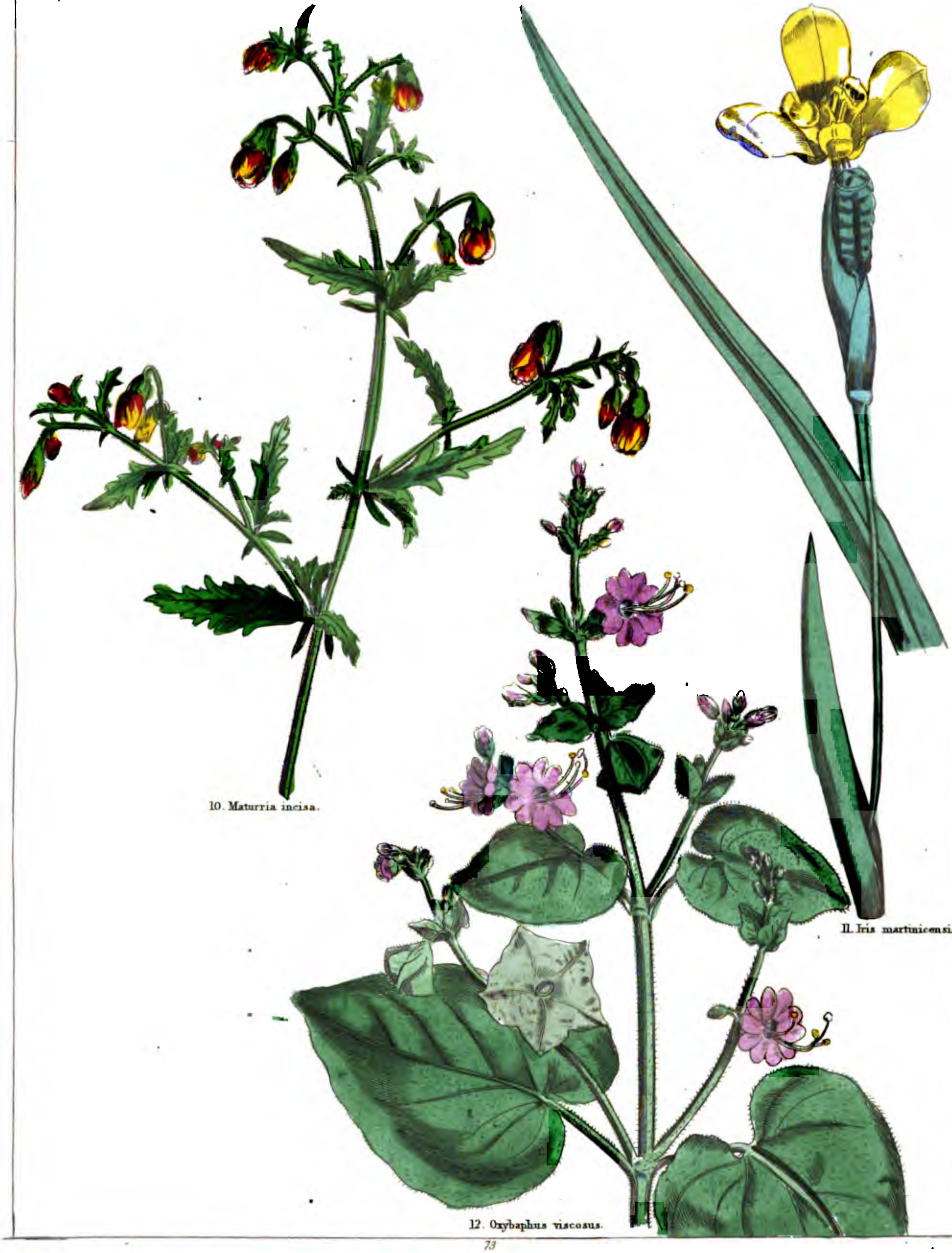
7. Primula Scotica



8. Mesembryanthemum Micans



9. Viola odorata



10. Maturria incisa.

11. Iris martinicensis.

12. Oxybaphus viscosus.

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